

# APPENDIX B

Agricultural Assessment

Natural Resources Assessment

Trail Concept Alternatives

Opinion of Estimated Costs

# BIJOU BASIN OPEN SPACE AGRICULTURAL MANAGEMENT PLAN

For

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Prepared by



AGPROfessionals

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## EXECUTIVE SUMMARY

The Bijou Basin Open Space is a 2,854-acre property consisting of rangeland, cultivated cropland, and riparian zones. One of the county's objectives during the open space development is to maintain a working property.

The land is operated under two short-term leases, one for rangeland grazing and the another for agricultural production.

The grasslands feature a variety of grasses and forbs, predominantly suitable for grazing. Encroachment of cheatgrass and spotted knapweed should be addressed through chemical, mechanical, and biological controls, which may include adjusting grazing pressure. The current three-pasture system has a conservatively estimated 285 animal unit months of grazing annually. While well-executed rotational grazing generally promotes healthier pastures, moderately stocked shortgrass prairie can also perform well under continuous grazing.

Dryland farming consists of a wheat-millet-fallow rotation, profitable in years of adequate rainfall. The most productive land on the property is presently utilized for farming. Sprinkler irrigation can be implemented on select parcels with accommodation for soil limitations.

Recommendations include modifying livestock management to incorporate rest periods for pastures, developing long-term grazing lease agreements that incorporating a grazing management plan benefiting both the lessor and lessee, increasing the utilization of Unit 4 for grazing, cropping, or wildlife habitat development, and continuing cropping operations, utilizing no-till techniques when possible and following a conservation plan to control erosion.

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## APPENDICIES

- A – Aerial Site Map
- B – NRCS Soil Survey Maps
- C – Enterprise Budgets

# 1. Introduction

The purpose of the Agricultural Management Plan ("Plan") is to offer guidance on the current and future grazing and farming operations at Bijou Basin Open Space, which presently covers 1,288 acres of the 2,854-acre property. Additionally, the Plan assesses the viability of continued farming in unit four, which spans approximately 1,515 acres, with 548 acres designated for cultivation. An aerial map of the property is in Appendix A.

The overarching goal for the property provides a philosophical foundation for the Plan. Arapahoe County staff articulated a priority to protect agricultural resources and practices, thereby continuing the region's agriculture and ranching heritage.

## 2. Current Conditions

### 2.1 Soils

The soil types are primarily loams and sandy loams. A total of 26 soil map units representing 22 soil series are intermixed over the property, with eight each representing at least 4% of the total acreage. A soils map is in Appendix B. None of the map units described in Table 1 have saturated zones within 72 inches of the surface, and none meet hydric criteria.

Table 1, Major Soil Map Units

| Soil Map Unit | Description/slope %                         | Acreage represented | % of Total Acreage | Farmland Classification | Land Capability Nonirrigated/Irrigated | Sprinkler Irrigation |
|---------------|---------------------------------------------|---------------------|--------------------|-------------------------|----------------------------------------|----------------------|
| AdC           | Adena-Colby Silt Loam, 1-5%                 | 246.5               | 8.3                | Statewide Importance    | 4e/NA                                  | Not limited          |
| BkB           | Beckton loam, 0-3%                          | 284.0               | 9.6                | Not Prime               | 6s/NA                                  | Very limited         |
| HIB           | Heldt clay, 0-3%                            | 168.0               | 5.7                | Prime if irrigated      | 3c/NA                                  | Somewhat limited     |
| LsD           | Litle-Samsil, gypsum, silty clay loam, 3-9% | 161.2               | 5.4                | Not Prime               | 4e-6s/NA                               | Somewhat limited     |
| NIB           | Nunn loam, 1-3%                             | 122.7               | 4.1                | Prime if irrigated      | 4e/3e                                  | Somewhat limited     |
| RhD           | Renohill-Buick loam, 3-9%                   | 168.6               | 5.7                | Not Prime               | 4e/NA                                  | Somewhat limited     |
| Su            | Sandy alluvial land                         | 460.1               | 15.5               | Not Prime               | 6w/NA                                  | Somewhat limited     |
| TeE           | Terry-Olney-Thedalund sandy loam, 5-20%     | 585.7               | 19.8               | Not Prime               | 6e/NA                                  | Somewhat limited     |

Natural Resources Conservation Service Web Soil Survey

AdC – Adena-Colby silt loams, 1-5% slopes: The Adena component makes up 65% of the map unit and the Colby comprises 25% of the map unit. Found on drainageways and hills, the parent material consists of eolian deposits. It is a deep, well-drained soil with low runoff potential, moderately high-water movement and high-water availability.

BkB – Beckton loam, 0-3% slopes: The Beckton component makes up 80% of this map unit. Found on flood plains, drainageways, and stream terraces, the parent material is alluvium. It is a deep, moderately well drained soil with low runoff potential, moderately low water movement and moderate water availability. A seasonal zone of water saturation is at 60 inches during April and May. The soil has a moderate saline horizon within 30 inches of the soil surface and a maximum sodium adsorption ratio of 20 within 30 inches of the soil surface.

HIB – Heldt clay, 0-3% slopes: The Heldt component makes up 90% of the map unit. Found on flood plains, drainageways, stream terraces, and uplands, the parent material consists of eolian deposits. It is a deep, well-drained soil with low runoff potential, moderately low water movement and moderate water availability. While there is no saline horizon within 30 inches of the soil surface, the maximum sodium adsorption ratio is 6 within 30 inches of the soil surface.

LsD – Little-Samsil, gypsum, silty clay loam, 3-9% slopes: The Little component makes up 55% of the map unit, with 3-9% slopes, and restrictive paralithic bedrock at 20-40 inches. The parent material consists of eolian deposits. The Samsil, gypsum component makes up to 30% of the map unit, with 3-5% slopes, and restrictive paralithic bedrock at 10-20 inches. Both soils are well drained, with low to medium runoff potential, moderately low water movement, and very low to moderate available water.

NIB – Nunn loam, 1-3% slopes: The Nunn component makes up 85% of the map unit. Found on terraces and river valleys, the parent material consists of Pleistocene aged alluvium and/or eolian deposits. It is a deep, well-drained soil with medium runoff potential, moderately low water movement and high available water.

RhD – Renohill-Buick loam, 3-9% slopes: The Renohill component makes up 65% of the map unit. Found on drainageways and uplands, the parent material consists of loam silty and clayey alluvium, and restrictive paralithic bedrock at 20-40 inches. The Buick component makes up 25% of the map unit. Found on ridges, the parent material consists of alluvium and/or eolian deposits, with no restrictive root layer in the top 60 inches. Both soils are well drained with medium runoff. The Renohill soil has moderately low to moderately high-water movement and low available water, while the Buick soil has moderately high-water movement and high available water.

Su – Sandy alluvial land: The Sandy alluvial land component makes up 95% of this map unit. Found in streams and drainageways, the parent material consists of sandy alluvium and/or loamy alluvium. It is a deep, somewhat excessively well drained soil with low runoff, high to very high-water movement, low water availability, and frequent floods.

TeE – Terry-Olney-Thedalund sandy loam, 5-20% slopes: This map unit is comprised of 40% Terry, 30% Olney, and 20% Thedalund soils. All the components are found on hills and uplands, are well drained, and have medium runoff potential. The parent material of Terry consists of residuum weathered from sandstone, with restrictive paralithic bedrock at 20-40 inches, moderately low water movement, and low available water. The Olney parent material consists of fine-loamy alluvium and/or clayey sandy alluvium, with no restrictive layer within the top 60 inches, moderately high-water movement, and moderate available water. The Thedalund parent material consists of interbedded residuum weathered from sandstone and shale, with restrictive paralithic bedrock at 20-40 inches, moderately low water movement, and low available water.

The majority of soils are not classified as prime farmland, and a land capability classification for irrigated conditions was not generally available in the soil survey. Soils with a land use classification greater than four are deemed unsuitable for cultivation. Soils with a classification of 3-4 have severe limitations that require careful management and/or plant selection. Subclasses indicated by a lowercase letter denote the primary hazard: ‘e’ denotes erosive issues, ‘s’ signifies shallow, drought-prone or stony conditions, ‘c’ denotes very dry or very cold soil, and ‘w’ refers to wetness, potentially requiring artificial drainage.

Sprinkler irrigation capability is somewhat limited, primarily due to either slow water movement or low water holding capacity. Limitations can be overcome through planning and design.

The soil survey reports for farmland classification, land capability, and sprinkler irrigation are in Appendix B.

## 2.2 Existing Infrastructure and Conditions

The property currently has 1,288 acres under a leased grazing program, with an additional 482-1514 acres potentially available for grazing.

Broad vegetation communities were summarized Bijou Basin Open Space, Natural Resources assessment. Estimates of species composition within the vegetative sward were derived from fifty transects. Forage conditions are considered average when the vegetative sward consists of 34-66% desirable plant species (Cook, et. al., 2017). Table 2 presents the broad vegetative communities, and the estimated grass percentage obtained from the transect study. The forage condition in all units is rated average.

Table 2: Vegetative Communities

| Unit Name | Vegetative Communities                                                                                                                                | Approximate Acreage                                           | Percent Grasses, native and introduced |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------|
| 1         | Western Great Plains Shortgrass Prairie                                                                                                               | 407                                                           | 50                                     |
| 2         | Western Great Plains Shortgrass Prairie<br>Western Great Plains<br>Riparian/Floodplain<br>Rocky Mountain Foothill Grassland                           | 318                                                           | 42                                     |
| 3         | Western Great Plains Shortgrass Prairie                                                                                                               | 563                                                           | 53                                     |
| 4         | Western Great Plains Shortgrass Prairie<br>Western Great Plains<br>Riparian/Floodplain<br>Herbaceous Planted/Cultivated<br>Nonnative Upland Grassland | 1514<br>Agricultural: 550<br>Riparian: 390<br>Shortgrass: 575 | 34                                     |

Currently existing infrastructure includes five foot tall, 5-6 wire, barbed wire perimeter and interior fencing dividing the property into four pasture units. Metal swing gates are situated at most corners and along many of the boundaries of each unit. Cattle handling facilities are located in Unit 1 adjacent to the southeast access road. Tree shade is available in Units 2 and 4.

Water troughs are positioned in each field within a mile of the unit's distal edge. A well located on an adjacent property supplies water to one trough in Unit 1, two troughs in Unit 3, and one trough on the west side of Unit 4. Additionally, two wells on the east side of Unit 4 were transitioned from windmills to solar powered pumps, and a spring was developed and previously utilized. The well on the east side of Unit 2 has collapsed and is scheduled for redrilling and the installation of a solar powered pump. In the interim, water is transported to a trough on the west side of the unit.

## 2.3 Current Grazing Management System

Forage availability is assessed in May, and stocking rates are adjusted to align with available forage. Cattle are maintained in two herds. Stocking rates are universally referred to as animal units equivalent (AUE), equivalent to 1,000 pounds of live weight per acre (including the suckling calf).

Currently Unit 1 is stocked with cow/calf pairs at a rate of 23 AUE, and Unit 3 is stocked at a rate of 29 AUE. The units are continuously grazed for four months. If forage quality is poor, supplemental cake feed is provided. In the fall, the herds are comingled and moved into Unit 2 for one or more months, depending upon forage availability. Unit 4 spans both sides of Bijou Creek and includes agricultural plots, hence it is not grazed at present.

Stocking rates have been reduced over the past two years due to drought conditions adversely affecting forage availability. The lessee considers the facilities to be adequate and weed prevalence and noxious weeds are not a concern.

### 3. Grazing Management Considerations

#### 3.1 Livestock Suitability

Consideration was given to livestock best suited to the facility, taking into account animal impact to rangeland and current infrastructure. Livestock species vary in grazing behavior, fencing and water needs, and requirements for protection from predators.

Bijou Basin Open Space is characterized by a predominance of grasses and forbs species, with relatively few rugged areas and all points of each pasture unit in close proximity to water sources. Cattle are well suited to the basin's landscape. Of the domesticated livestock, cattle have the most positive impact on the soil microbial population which are often deficient in semi-arid grasslands and crucial to prairie health. Additionally, cattle hoof contact with soils mechanically incorporates and recycles senesced vegetation and nutrients. The current facilities are designed for cattle, with only water trough repairs and potentially cross fencing investments required.

Bison provide comparable advantages to cattle. Additionally, they demonstrate resilience in both hot and cold climates, consume a broader range of forbs than cattle, and integrate well into native rangeland restoration. Bison ranching tends to yield higher economic profitability compared to other forms of livestock production.

Nevertheless, it is important to recognize that bison are strong, inherently wild animals and cannot be treated like cattle. They possess a larger flight zone and exhibit shorter tempers than cattle and become stressed more easily. Furthermore, bison are capable of reaching speeds of up to 40 miles per hour over considerable distances.

Bison require more robust fencing than cattle. An adult bison is capable of jumping up to 6 feet in height and can push through any fence if sufficiently motivated. Consequently, it is essential to erect fences at the eye level of bison. Depending upon the size of the bison, a 5-5.5-foot fence may deter attempts to cross it. However, for enhanced security some producers and bison associations recommend 6–7-foot fences which prevent bison from reaching their heads over the fence and jumping over it. By these standards, fences at the property are the minimum recommended height, however taller fences are suggested. The high tensile barbed wire present at the site is generally adequate, and bison may be trained to respect an electric fence. Calves may crawl underneath the fences that have been raised to allow wildlife to pass under. Bison have particularly strong maternal instincts, exhibit heightened herd aggressiveness during calving and are particularly protective of newborns, which could give a cow sufficient motivation to push through the fence.

Handling facilities at the site are suitable for cattle are insufficient for bison for multiple reasons. Fences are recommended to be 7 feet in height. Sorting pens, working chutes, and squeeze chutes need to be more robust and spacious than for cattle. Additionally, the facilities should be designed to allow animals to see forward while minimizing their ability to view humans. Bison

facilities should be designed with escape routes to ensure the safety and well-being of both the bison and handlers during handling procedures.

A higher level of management is required to ensure sufficient forage availability to prevent bison from escaping fences. Bison that are well fed, properly watered, and maintained in a harmonious social group are less likely to seek escape. Forage should be assessed throughout the grazing season to confirm that the supply remains sufficient to meet the animals' needs.

Sheep are well suited to grazing alongside cattle and utilize forbs better than cattle. They may withstand longer travel distances to drinking water sources. Sheep can be trained to graze knapweed and thistle early in the growing season; however, this may necessitate the use of temporary electric fencing to do so. Despite their benefits, sheep do not contribute as significantly to soil health due to their size and manure characteristics. Moreover, a fence compatible for wildlife movement may not be compatible for all sheep operations. Handling facilities appropriate for cattle are too large for sheep, and predators may be a concern.

It is suggested that cattle or bison be grazed at the facility due to their positive impact on soil health. The decision on which to graze will depend upon the risk and financial investment in infrastructure willing to be undertaken. The plan for development of the site and desire for multiuse pastures that allow both livestock and public access should also be considered. If multiuse is desirable, cattle are the recommended choice.

### 3.2 Forage Requirements

All ruminants, including cattle, bison, sheep, consume about 2% of their bodyweight in forage on rangeland when intake is averaged across periods of dormancy and active growth, regardless of species. Consequently, forage requirements per animal unit are equal across ruminant species. The AUE calculation is based upon an animal consuming 2.7% of its bodyweight in dry matter forage. One AUE requires about 27 pounds dry matter per day, or 825 pounds dry matter forage per month.

The dry matter intake of various species of livestock and wildlife are listed in Table 3. Note that the AUE will vary depending upon weight of the animal. A mature cow ranges from 1 to 1.5 AUE, and bison can range from one to two AUE. Using the values from Table 3, a pasture that will support one mature cattle will support 6 sheep or 0.6 bison. A 1,000 lb bison (1 AUE) will consume 27 lbs of dry forage daily, and a larger cow at 1400 lbs (1.4 AUE) will consume 38 lbs of dry forage daily.

Table 3: Dry Matter Intake of animal species

| Animal          | Animal Unit Equivalent | Daily Dry Matter Intake, lbs/head |
|-----------------|------------------------|-----------------------------------|
| Mature Cattle   | 1.0                    | 27                                |
| Yearling Cattle | 0.75                   | 20.3                              |
| Sheep           | 0.15                   | 4.1                               |
| Bison           | 1.8                    | 48.6                              |

|                    |      |     |
|--------------------|------|-----|
| Mule Deer          | 0.15 | 4.1 |
| Pronghorn Antelope | 0.12 | 3.2 |

Holechek, Jerry L., 1988

### 3.3 Recommended Grazing Management

A rotational grazing system that allows for an adequate recovery period for forage regrowth yields the healthiest and most abundant forage. Intensive grazing with high stocking density reduces animal selection and overgrazing of desirable plants and under grazing of less desirable plants. The grazing system requires annual planning, adjustment of stocking densities according to forage availability, close monitoring, and flexibility. Additional fencing and, at times, watering troughs are necessary, with electric fences often utilized to increase pasture cells within a unit without the expense of constructing permanent fence. Livestock should be trained to respect the electric fence. When implemented correctly, rotational grazing has been shown to increase nutrient cycling, soil organic matter, water infiltration, beneficial species, and therefore forage production and animal performance per acre over time. Improper implementation can adversely affect pasture plant health. Intensive grazing equates to intensive management.

Best management practices often include more intensive grazing of smaller paddocks. The USDA-ARS has been conducting research at the Central Plains Experimental Range in Nunn, CO, since the 1930's. From 2012 through 2022 both intensive grazing and continuous grazing were practiced on two separate pasture systems. Stocker cattle were grazed from May through September on shortgrass prairie in a semiarid environment. Under these conditions, no benefit to rotational grazing was seen in terms of animal performance or vegetation shifts when compared to continuously grazed pastures under moderate stocking rates of 0.22 AUM per acre (Augustine, et. al., 2020).

Typically, a grazing system aims to achieve three goals: financial/economic, lifestyle/quality of life, and environmental/landscape goals. A grazing program must be designed with the needs of the lessor and lessee in mind. Consider future grazing leases of a minimum of 3-5 years that require a grazing plan which will meet the needs of both lessor and lessee.

Annual stocking capacity of the pastures was estimated using Colorado State University's (CSU) Rangeland Carrying Capacity App, Range Analysis Platform (RAP). RAP uses satellite imagery verified at a program level with thousands of ground assessments, combined with cloud computing and machine learning technology. The results are summarized in Table 4a. A sustainable stocking rate of 48 AUE is recommended for the 4-month summer period, divided into 22 AUE on Unit 1 and 26 AUE on Unit 3 and then comingled into Unit 2 in the fall for one month. The AUE will vary depending upon seasonal growing conditions and should be assessed annually and throughout the growing season.

The stocking rate calculations are conservative, assuming 25% forage utilization, with 50% of the forage left as residual, and 25% of the forage lost to trampling and wildlife consumption. Further adjustments to forage availability were made for unusable areas due to slopes greater than 15%, riparian zones, and non-edible vegetation. Holechek (1988) suggests that arid

grasslands may sustain a 40% utilization, with adjustments made in years of drought or abundant rainfall. Therefore, as desirable plant species reestablish, and if grazing monitoring indicates excess forage availability, upward adjustments to stocking rates may be made.

Table 4a: Estimated Pasture Carrying Capacity for a 120-day grazing period

| Unit            | Acres | Edible <sup>1</sup><br>(%) | Utilization <sup>2</sup><br>(%) | CSU Model        |                  |
|-----------------|-------|----------------------------|---------------------------------|------------------|------------------|
|                 |       |                            |                                 | AUE <sup>3</sup> | AUM <sup>4</sup> |
| 1               | 397   | 80                         | 25                              | 22               | 95               |
| 2               | 317   | 70                         | 25                              | 17 <sup>5</sup>  | 76               |
| 3               | 563   | 70                         | 25                              | 26               | 114              |
| 4W <sup>6</sup> | 473   | 70                         | 25                              | 18               | 79               |

Notes:

1. % Edible reduces total forage due to high slopes, unpalatable forbs and shrubs, and alluvial zones.
2. % Utilization is the amount of forage consumed by animals after trampling, wildlife consumption, and desired residual.
3. An animal unit equivalent (AUE) is a 1,000 lb. animal consuming 2.67% of its body weight in dry forage for 120 days.
4. Animal Unit Month is the amount of forage consumed by 1 AUE monthly.
5. If the grazing period is shortened to 1 month, 68 AUE may be grazed.
6. 4W is the west half of Unit 4, west of Bijou Creek, excluding the associated riparian area.

An AUE is 1,000 lbs of animal, and an AUM is the amount of forage an AUE will consume in one month. The carrying capacity of other animal classes can be calculated by multiplying by 1,000 and dividing by animal weight (see Table 4b).

Table 4B: Estimated Carrying Capacity for various livestock classes

|                                                      | 1,000 lb cow/calf<br>(bovine or bison) | 1,200 lb cow/calf<br>(bovine or bison) | 750 lb feeder<br>(bovine or bison) |
|------------------------------------------------------|----------------------------------------|----------------------------------------|------------------------------------|
| 22 AUE                                               | 22                                     | 18                                     | 29                                 |
| 285 total AUM,<br>grazed over 4 months <sup>1</sup>  | 71                                     | 59                                     | 95                                 |
| 285 total AUM,<br>grazed over 12 months <sup>1</sup> | 24                                     | 20                                     | 32                                 |

Notes:

1. Assumes short season prairie grass, annual production utilized during grazing period.

Forage plants can be weakened when grazed repeatedly during critical growth stages. To support survivability of both warm and cool season grasses, it's recommended that early season grazing be initiated in a different field each year. In the current two-herd system, this can be achieved by incorporating all three units into the spring rotation, using two units and reserving a different one each year for fall grazing. Alternatively, the three units can be divided into two pastures using either temporary or permanent electric fencing, initiating spring and fall grazing in different portions of the unit each year.

Unit 4 consists of a mixture of grassland, vacant agricultural land, cultivated cropland, and riparian zones. The unit represents an opportunity for use as emergency grazing, or as part of the pasture rotation. Investment in fencing is necessary to protect crops during the growing season,

and to limit access to riparian areas. Short duration grazing should be practiced on the riparian areas for preservation and enhancement of natural resources. The carrying capacity listed in Table 4 includes only the west half of Unit 4 and excludes the riparian area.

### 3.4 Paddock Design and Layout

No changes to the pasture design are presently required when stocked at recommended levels. With a two-herd management system, either a two-wire fence or portable, solar powered electric fence can be used to bisect all fields. Bisect Units 1 and 3 so that the water trough might be shared in both paddocks. Divide Unit 2 at the creek. Provisions for water will be required in Unit 2, and the existing temporary trough established on the west side of the pasture should remain. Permanent fencing may be used as the basis for further subdivisions should more intensive grazing be practiced.

### 3.5 Livestock and/or Hay Barns/Loafing Sheds

The construction of barns and loafing sheds is not recommended. Livestock should be relocated to a sacrifice area such as the animal handling area or removed from the site when forage is not available. Loafing sheds encourage congregation and overuse of areas surrounding the sheds. Rangeland cattle are bred to endure conditions of rangeland without shelter.

### 3.6 Pasture Weed Control

The Natural Resources Report detailing the weed species observed during species identification indicate the presence of noxious weeds. Weed management protocols should continue to prevent the proliferation of existing populations. Complete eradication is challenging, several control strategies are available:

1. Maintain healthy vegetation of desirable species
2. Prevent seed formation and the spread of weeds
3. Integrate chemical, mechanical and grazing controls

Noxious weeds identified include Cheatgrass and Common Mullein (List C), and Spotted Knapweed and Diffuse Knapweed (List B). Under the Colorado Noxious Weed Act, it is recommended that control measures be implemented for species categorized as List C, while species listed under List B should be prevented from spreading. Cheatgrass and Spotted Knapweed are most prevalent on the property. These weeds may be targeted for intensive grazing.

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | <b>Cheatgrass</b>                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Introduction       | Cheatgrass (Downy brome) is a winter annual, emerging in the fall and producing most growth in the early spring.                                                                                                                                                                                                                                                                                                                         |
| Grazing            | It is best grazed two times in the spring, with the first grazing occurring just before the seedhead emerges, and a second time before panicles emerge 3-4 weeks later. Graze to the height required to protect desirable grasses. Winter grazing will reduce mulch, hindering cheatgrass establishment and favoring perennial grass establishment. Continue this management program for at least two consecutive years.                 |
| Mechanical Control | Mechanical control is not recommended for this species.                                                                                                                                                                                                                                                                                                                                                                                  |
| Chemical Control   | Several herbicides are available. A crop protection specialist or county Extension Agent should be contacted for the current herbicides approved for use and the related application timing. In most cases, spray should occur during the cooler seasons of early fall or late spring when cheatgrass is growing but most desirable species are dormant. Applications should occur when plants are 10 cm or less and growing vigorously. |

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | <b>Spotted Knapweed (chemical control for Spotted and Diffuse Knapweed are the same).</b>                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Introduction       | Spotted Knapweed is a non-creeping, short-lived perennial that reproduces from seed. One shoot per year is produced from a taproot. It germinates in the spring or fall, forming a rosette, and resumes growth in the early spring. Flowering may occur from June to October, and most seed set usually occurs mid-August. Management focuses on preventing seed production.                                                                                                                                        |
| Grazing            | If practicing intensive grazing, cattle can be grazed twice for 10 days each in spring at 50% utilization of forages to decrease seed set. Graze when knapweed is bolting and when about 6-12 inches tall. Note that cattle tend to avoid the plant and have difficulty grazing the rosette, so intensive grazing is important for success. Grazing after seed set can transfer seeds to other areas. Foraging is more successful with sheep and could be considered with changes to fencing if other options fail. |
| Mechanical Control | Mowing one time at the bud or early flower stage stresses the plant but will not kill it without several years of repeated stress. Do not mow after seed-set. Mature seeds are easily transferred on vehicles. Avoid driving through infestations. Check the undercarriage of vehicles to ensure no seeds are harbored.                                                                                                                                                                                             |
| Chemical Control   | Herbicides are highly effective in controlling knapweed when used in conjunction with cultural control and best controlled at the rosette stage in the spring or fall. A crop protection specialist or county Extension Agent should be contacted for the current herbicides approved for use and the related application timing.                                                                                                                                                                                   |
| Biological Control | Numerous insects are available for biological control. Insects effective in destroying seeds and roots are available from the Colorado Department of Agriculture, Palisade Insectary.                                                                                                                                                                                                                                                                                                                               |

|                    | <b>Common Mullein</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Introduction       | Common mullein is a biennial forb, forming a basal rosette in the fall of the first year. In the spring of the second year, it produces an erect stem 2-6 feet tall, with a terminal flower spike and seeding occurring from June to August. The plant has a deep taproot along with a fibrous root system and is a prolific seed producer.                                                                                                                             |
| Grazing            | Mullein has low palatability, and livestock avoid this plant if other forage is available.                                                                                                                                                                                                                                                                                                                                                                              |
| Mechanical Control | Mow plants with elevated stems prior to seed production. Repeated mowings between bolting and early flowering may be required. Manually remove plants, severing the plant below the soil surface, if possible, while minimizing soil disturbance, and place any seedheads in a bag.                                                                                                                                                                                     |
| Chemical Control   | Several herbicides are available. A crop protection specialist or county Extension Agent should be contacted for the current herbicides approved for use and the related application timing. Rosettes are highly susceptible to herbicides in early fall when translocating nutrients to the roots. A surfactant or adjuvant is often required by the specific herbicide for best control. Chemical control becomes far less effective once the plant reaches maturity. |
| Biological Control | The curculionid weevil feeds on seeds and can destroy up to 50% of the seeds. The weevil has not yet been approved for use in Colorado. Contact the Colorado Department of Agriculture, Palisade Insectary, for more information.                                                                                                                                                                                                                                       |

### 3.7 Leasing Recommendations

Short term leases may be preferred by some lessees to accommodate adjustments based on forage conditions. Conversely, long term leases offer lessees the opportunity to invest in management and resources to develop a more intensive grazing system, and to utilize the Natural Resource Conservation Service (NRCS) services and its cost share program. A long-term lease with a fee structure based on dollars per head per month is likely to satisfy the needs of both lessee and lessor. Additionally, lessees may be asked to provide a grazing management plan or summary of intended grazing practices.

CSU surveys landowners, agricultural producers and managers, lenders, agricultural consultants, machine operators, and Extension Agents annually to determine land rental rates for Colorado farms and ranches. Electronic data is summarized for areas east and west of the Rocky Mountains and I-25. Reported rates represent a variety of conditions and reflect the range of rates reported by respondents and should not be interpreted as recommended rates.

Table 5 is an excerpt from Colorado State University Extension Agriculture and Business Management, “2023 Land Rental & Custom Rates for Colorado Farms & Ranches”, May 2024, page 5. Native range is valued from between \$4 and \$35 per head, depending upon the age of the animals.

Table 5: Livestock Land Rental Arrangements

| Activity                           | Basis For Charge | Eastern Region |        | Western Region |        |
|------------------------------------|------------------|----------------|--------|----------------|--------|
|                                    |                  | Range          | Median | Range          | Median |
| Livestock Land Rental Arrangements |                  |                |        |                |        |
| Sheep – Grazing                    |                  |                |        |                |        |
| All Pasture Types                  | \$/head/day      | 0.67 – 1.50    | 0.67   | 0.08 – 2.71    | 0.25   |
| Beef Cows – Grazing                |                  |                |        |                |        |
| Native Range                       | \$/head/month    | 18.00 – 35.00  | 25.50  | 10.00 – 45.00  | 20.00  |
| Irrigated Pasture                  | \$/head/month    | 19.00 – 50.00  | 30.00  | 15.00 – 90.00  | 25.00  |
| Wheat Pasture                      | \$/head/month    | 28.00 – 30.00  | 30.00  | 15.00 – 22.00  | 18.50  |
| Corn/Milo Stalks                   | \$/head/month    | 15.00 – 35.00  | 30.00  | 15.00 – 30.00  | 22.50  |
| Crop Stubble + Aftermath           | \$/head/month    | 18.00 – 22.50  | 30.00  | 10.00 – 25.00  | 20.00  |
| Yearling Cattle – Grazing          |                  |                |        |                |        |
| Native Range                       | \$/head/month    | 4.00 – 25.50   | 14.75  | 10.00 – 20.00  | 15.00  |
| Irrigated Pasture                  | \$/head/month    | 10.00 – 30.00  | 20.00  | 15.00 – 45.00  | 15.00  |
| Wheat Pasture                      | \$/head/month    | 25.00 – 26.00  | 26.00  | 16.00 – 17.00  | 17.00  |
| Horses – Grazing                   |                  |                |        |                |        |
| All Pasture types                  | \$/head/month    | 30.00 – 30.00  | 20.00  | 7.00 – 34.00   | 20.50  |

Entries bolded or highlighted in grey are rates previously reported in the 2022 custom rates survey.

## 4. Pasture Restoration and Grazing Opportunities

Adjusting grazing management practices will allow native and desirable grasses to repopulate sparse and weedy fields. This is the most desirable method of improving pastures. A summary of the recommended adjustments include:

- Initiate spring grazing on a different pasture each year
- Maintain moderate stocking rates and maintain forage residual
- Subdivide units into two or more pastures
- Consider developing an intensive grazing program which meets the needs of both lessee and lessor
- Incorporate portions of Unit 4 into the grazing system if finances allow.

Reseeding will remove a pasture from the grazing program for 3-5 years. All vegetation should be controlled through the application of herbicides. NRCS has established the following process for establishing native forage.

1. Apply chemical vegetation control at the appropriate time.

2. Conduct no-till planting of a sterile sorghum early summer and allow the crop to mature (a no-till drill is available through the Arapahoe County NRCS office).
3. In the fall, no-till a grass seed mix recommended by NRCS or reputable seed dealer into the sorghum residue to make best use of spring rains. Control weeds the first several years after establishment through mowing and herbicide use.

## 5. Agricultural Assessment of Unit 4

### 5.1 Current Use

Unit 4 encompasses 550 acres of historically cropped land. Of this area, approximately 370 acres east of Bijou Creek are currently cultivated by a lessee in a dryland wheat-millet-fallow system. Weeds, including cheatgrass, volunteer rye, sand dropseed and red threeawn, are controlled through a combination of chemical and tillage management in wheat, while chemical management is employed for millet. Tillage prior to wheat seeding is essential for effective weed control. Erosion is reduced through crop residue management. The cultivation of alternative crops in a dryland system does not justify the cost of production. Rainfall limits productivity, with wheat yields at other farms in the area ranging from 0-40 bushels/acre.

### 5.2 Potential Crop Yields and Revenue

Arapahoe County's average yield data published on the National Agricultural Statistics Service website was entered into CSU Extension's crop enterprise budgets under the designation "my farm." The budgets were developed from average costs and incomes associated with growing the crop on a regional basis and were not modified for this analysis other than to include updated yield information. Actual production costs vary significantly based upon individual operations. Dryland wheat and millet are potentially profitable at higher yields. Dryland grass hay and corn are not expected to be profitable (Table 6). Selected budgets are in Appendix C.

Table 6: Arapahoe County Crop Yield and Profitability Summary

| Crop    | Irrigation              | Yield<br>Date Range | Average<br>Yield <sup>1</sup> | Units  | Profitability <sup>2</sup><br>(\$ per acre) |
|---------|-------------------------|---------------------|-------------------------------|--------|---------------------------------------------|
| Alfalfa | Dryland                 | 2001-2006           | 0.86                          | tons/a | n/a                                         |
|         | Irrigated               | 2001-2006           | 3.95                          | tons/a | \$371.81                                    |
| Corn    | Dryland                 | 1999-2003           | 43.1                          | bu/a   | -\$164.03                                   |
|         | Irrigated               | 1999-2003           | 128.8                         | bu/a   | \$93.33                                     |
| Hay     | Dryland                 | 2004-2008           | 1.02                          | tons/a | -\$79.75                                    |
| Millet  | Statewide               | 2019-2023           | 24.7                          | bu/a   | \$165.83                                    |
|         | Dryland                 | Lessee              | 24.7                          | bu/a   | \$165.83                                    |
| Wheat   | Dryland<br>Wheat/Fallow | 2002-2007           | 23.7                          | bu/a   | -\$25.60                                    |
|         | Dryland<br>Wheat/Fallow | Lessee              | 35                            | bu/a   | \$56.33                                     |
|         | Irrigated               | 2001-2007           | 48.4                          | bu/a   | -\$33.40                                    |
|         | Irrigated               | 2001-2007           | 60                            | bu/a   | \$65.08                                     |

Notes:

1. Yields obtained from the most recent data, National Agricultural Statistics Service
2. Profitability obtained from Colorado State University Extension Agriculture and Business Management 2023 Enterprise Budgets, using average costs in the region closest to the site, yields as indicated, and does not include land payment.

The NRCS soil survey identified 750 acres as being either prime farmland, potential prime farmland if irrigated, or farmland of state importance. Several of these soils are located in both historically and currently cultivated fields. The enterprise budgets above show that dryland millet and wheat are potentially profitable only when adequate yields are achieved. Another concentration of prime farmland exists on the north half of Unit 3, but as native vegetation persists, the area is more suitably maintained as rangeland.

Sprinkler irrigation suitability information was obtained from the NRCS soil survey. While most of the property has no limitations or some limitations for sprinkler irrigation, the cost of developing water rights should be weighed against the potential income and the goals of the county. Additionally, an erosion management plan should be developed for any grasslands converted to cultivation.

### 5.3 Lease Types

Tables 7 and 8 are excerpts from Colorado State University Extension Agriculture and Business Management, “2023 Land Rental & Custom Rates for Colorado Farms & Ranches”, May 2024, page 6, and provide information regarding crop land cash rental and land share rents, respectively.

Table 7: Crop Land Cash Rates

| Activity                                                                              | Basis For Charge | Eastern Region |        | Western Region |        |
|---------------------------------------------------------------------------------------|------------------|----------------|--------|----------------|--------|
|                                                                                       |                  | Range          | Median | Range          | Median |
| Crop Land Cash Rents The numbers reported represent a per year (growing season) rate. |                  |                |        |                |        |
| Irrigated Land                                                                        |                  |                |        |                |        |
| Corn/Sorghum                                                                          | \$/acre          | 85 – 275       | 205    | 115 – 280      | 130    |
| Small Grains                                                                          | \$/acre          | 85 – 1,000     | 210    | 200 – 333      | 225    |
| Alfalfa                                                                               | \$/acre          | 40 – 225       | 100    | 45 – 208       | 165    |
| Small Grains                                                                          | \$/acre          | 80 – 225       | 125    | 200 – 333      | 225    |
| Potatoes                                                                              | \$/acre          | 500 – 600      | 600    | 208 – 375      | 333    |
| Vegetables                                                                            | \$/acre          | 170 – 300      | 235    | 200 – 350      | 316.50 |
| Sugar Beets                                                                           | \$/acre          | 205 – 300      | 252.5  | n/a            | n/a    |
| Non-Irrigated Land (Dryland)                                                          |                  |                |        |                |        |
| Corn/Sorghum                                                                          | \$/acre          | 25 – 50        | 40     | 120 – 160      | 160    |
| Small Grains                                                                          | \$/acre          | 13 – 55        | 40     | 15 – 70        | 30     |
| Feed/Hay                                                                              | \$/acre          | 10 – 55        | 20     | 60 - 120       | 100    |
| Oil Seed and Millet                                                                   | \$/acre          | 30 - 55        | 35     | 40 – 70        | 56     |

Table 8: Crop Land Share Rents

| Activity                                                                                                                                                                                          | Basis For Charge | Eastern Region |        | Western Region |        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------|--------|----------------|--------|
|                                                                                                                                                                                                   |                  | Range          | Common | Range          | Common |
| <b>Crop Land Share Rents</b> The numbers reported represent the tenant's share of production and expenses. It is assumed that the remainder of production and expenses are the landowner's share. |                  |                |        |                |        |
| Irrigated Land                                                                                                                                                                                    |                  |                |        |                |        |
| Corn/Sorghum                                                                                                                                                                                      | Tenant's share   | 40% - 75%      | 70%    | 67% - 75%      | 67%    |
| Small Grains                                                                                                                                                                                      | Tenant's share   | 50% - 75%      | 67%    | 33% - 75%      | 50%    |
| Alfalfa                                                                                                                                                                                           | Tenant's share   | 40% - 67%      | 60%    | 25% - 75%      | 60%    |
| Sugar Beets                                                                                                                                                                                       | Tenant's share   | 33% - 70%      | 67%    | 25% - 75%      | 75%    |
| Non-Irrigated Land (Dryland)                                                                                                                                                                      |                  |                |        |                |        |
| Corn/Sorghum                                                                                                                                                                                      | Tenant's share   | 25% - 75%      | 67%    | 30% - 75%      | 67%    |
| Small Grains                                                                                                                                                                                      | Tenant's share   | 25% - 75%      | 67%    | 25% - 75%      | 67%    |
| Grass Hay + Feed                                                                                                                                                                                  | Tenant's share   | 25% - 67%      | 67%    | 40% - 80%      | 67%    |
| Oil Seed and Millet                                                                                                                                                                               | Tenant's share   | 25% - 75%      | 75%    | 30% - 70%      | 67%    |

Entries bolded or highlighted in grey are rates previously reported in the 2022 custom rates survey.

As the cost of production rises, interest in farming these small parcels may diminish. Restoration of native prairie may be a viable solution. Prairie restoration is a long-term process, dependent upon favorable weather conditions and should commence up to five years before the intended use. Section 4 details the process to be used.

An alternative to production agriculture or prairie restoration is to consider specific wildlife needs and develop habitat in the previously cultivated areas which will attract desirable wildlife species.

## 6. References Cited

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## **APPENDIX A**

### **Aerial Site Map**

# Bijou Basin Open Space (Overview)

63250 E. Quincy Ave at 4300 S.  
Bradbury Rd  
Byers, CO 80103

Shortgrass: ~1,800 acres

Riparian: ~475 acres

Agriculture: ~550 acres

Total: 2,825 acres

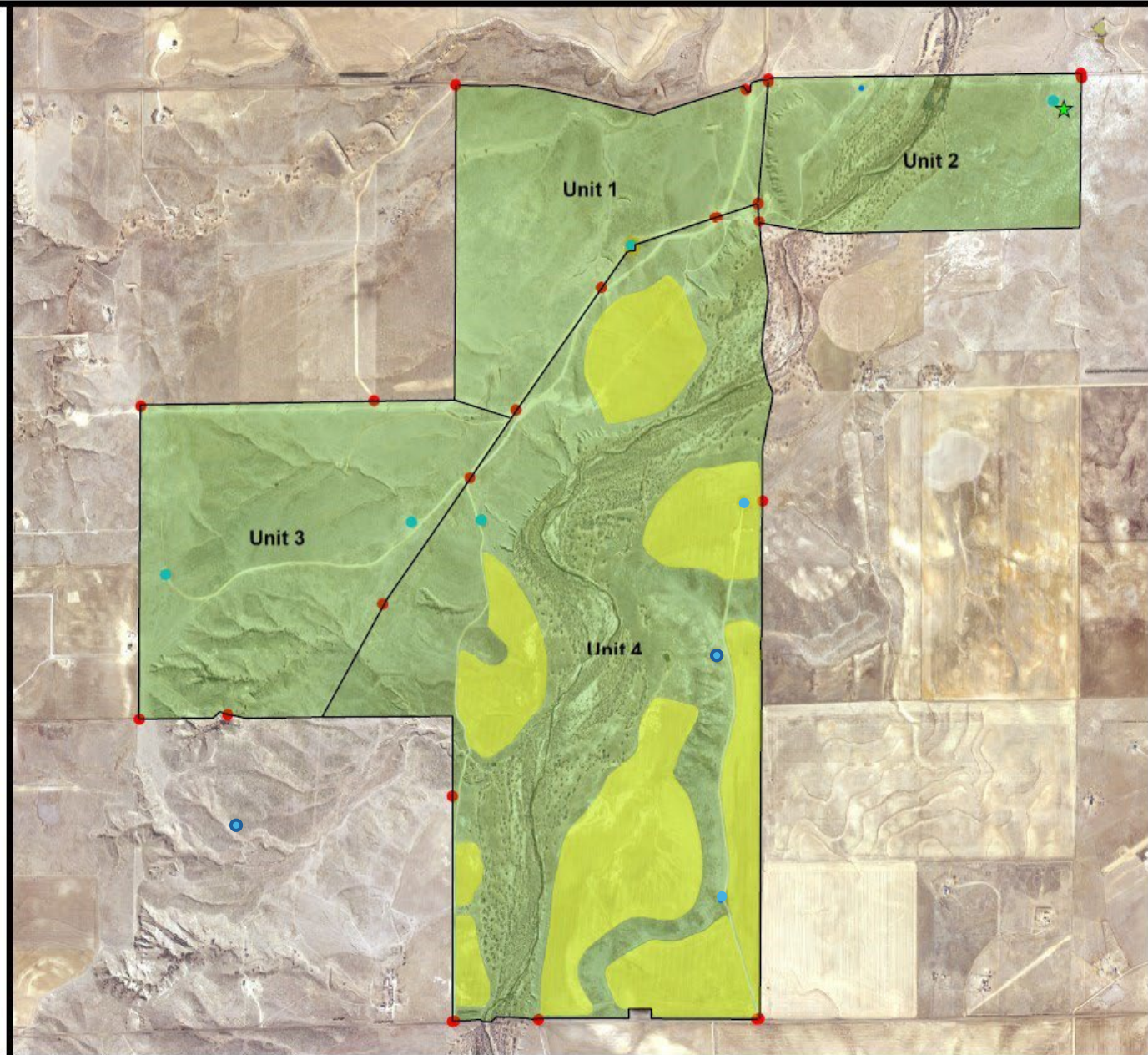
Amenities:

Lockable gates/cattle guards  
Permanent stock tanks  
Dempster Windmills  
Corral  
Large Cottonwood gallery  
Barbed wire fences

## Legend

- Gates
- Stock Tanks
- ★ Windmill
- Spring
- Agriculture Unit

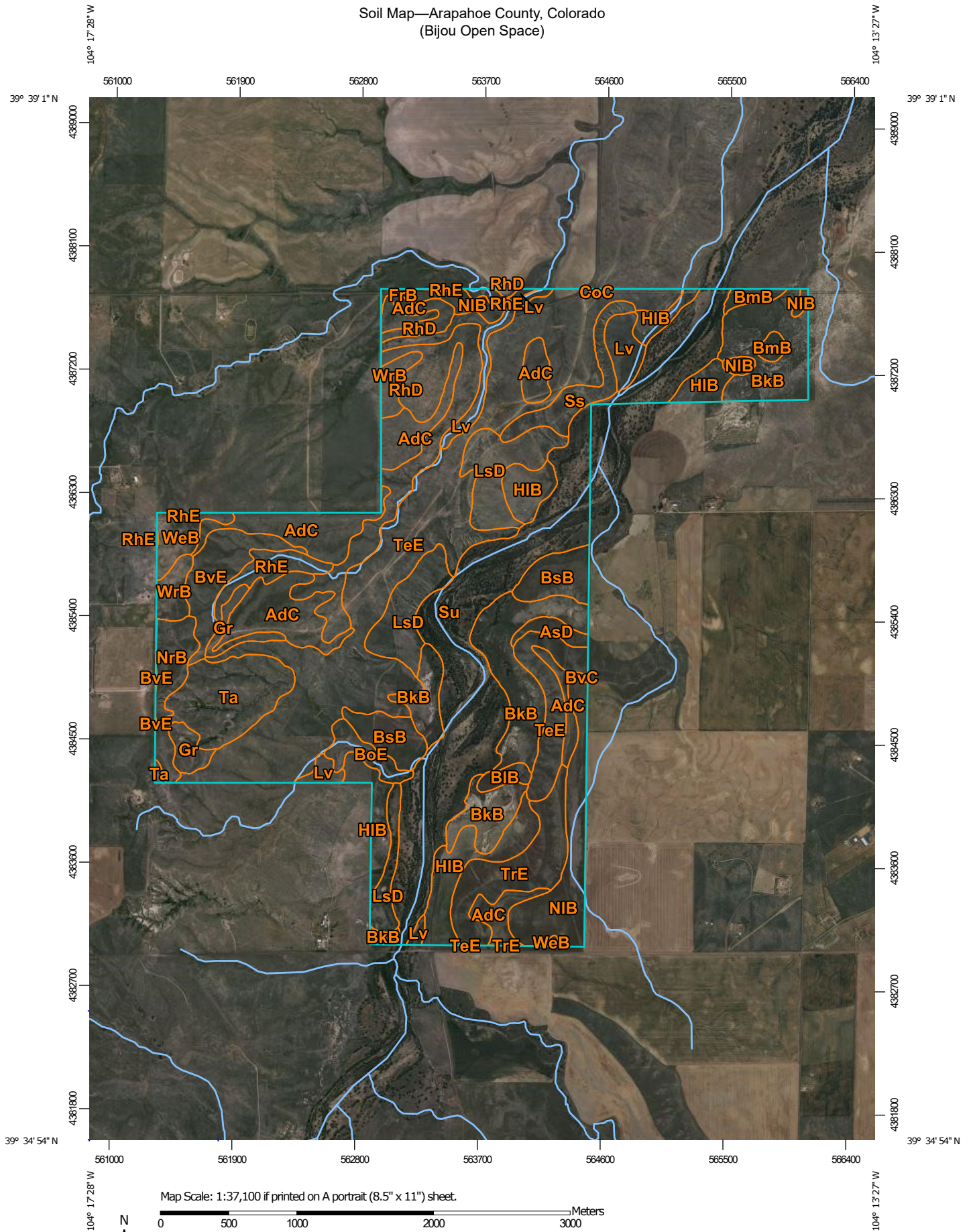
0 1,500 3,000 Feet



## **APPENDIX B**

### **NRCS Soil Survey Maps**

# Soil Map—Arapahoe County, Colorado (Bijou Open Space)



**Natural Resources  
Conservation Service**

Web Soil Survey  
National Cooperative Soil Survey

6/3/2024  
Page 1 of 4

Soil Map—Arapahoe County, Colorado  
(Bijou Open Space)

## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

### Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

### Water Features



Streams and Canals

### Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

### Background



Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Arapahoe County, Colorado

Survey Area Data: Version 19, Aug 24, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 9, 2021—Jun 12, 2021

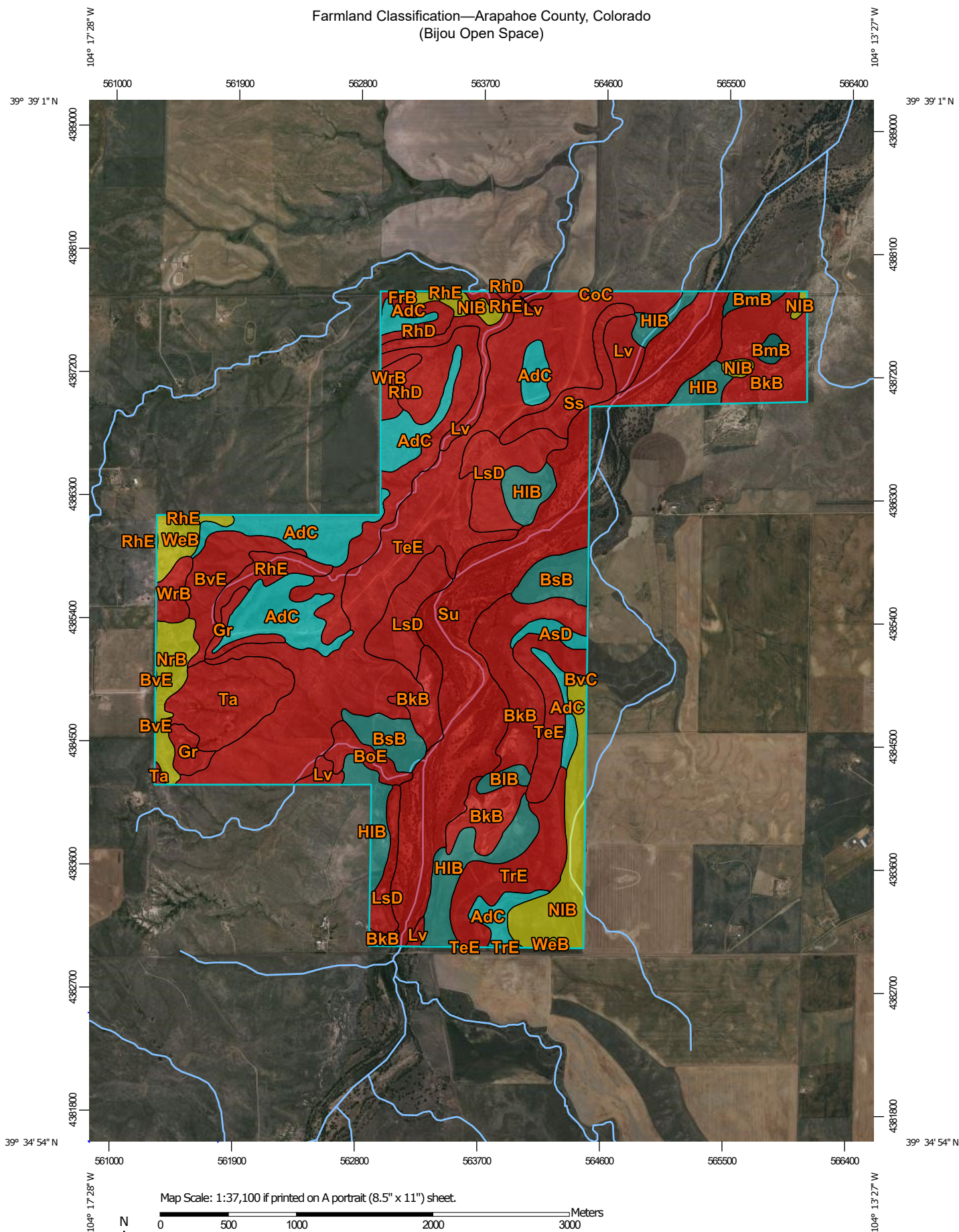
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

| Map Unit Symbol | Map Unit Name                                                  | Acres in AOI | Percent of AOI |
|-----------------|----------------------------------------------------------------|--------------|----------------|
| AdC             | Adena-Colby silt loams, 1 to 5 percent slopes                  | 246.5        | 8.3%           |
| AsD             | Ascalon sandy loam, 5 to 9 percent slopes                      | 14.7         | 0.5%           |
| BkB             | Beckton loam, 0 to 3 percent slopes                            | 284.0        | 9.6%           |
| BIB             | Bijou sandy loam, 0 to 3 percent slopes                        | 12.0         | 0.4%           |
| BmB             | Bijou sandy loam, wet, 0 to 3 percent slopes                   | 18.8         | 0.6%           |
| BoE             | Blakeland loamy sand, 1 to 20 percent slopes                   | 27.1         | 0.9%           |
| BsB             | Bresser sandy loam, terrace, 0 to 3 percent slopes             | 79.0         | 2.7%           |
| BvC             | Bresser-Truckton sandy loams, 3 to 5 percent slopes            | 1.2          | 0.0%           |
| BvE             | Bresser-Truckton sandy loams, 5 to 20 percent slopes           | 67.3         | 2.3%           |
| CoC             | Colby silt loam, 1 to 5 percent slopes                         | 1.0          | 0.0%           |
| FrB             | Fort Collins loam, 0 to 3 percent slopes                       | 6.3          | 0.2%           |
| Gr              | Gravelly land                                                  | 35.2         | 1.2%           |
| HIB             | Heldt clay, 0 to 3 percent slopes                              | 168.0        | 5.7%           |
| LsD             | Little-Samsil, gypsum, silty clay loams, 3 to 9 percent slopes | 161.2        | 5.4%           |
| Lv              | Loamy alluvial land                                            | 80.0         | 2.7%           |
| NIB             | Nunn loam, 1 to 3 percent slopes                               | 122.7        | 4.1%           |
| NrB             | Nunn-Bresser-Ascalon complex, 0 to 3 percent slopes            | 51.0         | 1.7%           |
| RhD             | Renohill-Buick loams, 3 to 9 percent slopes                    | 168.6        | 5.7%           |
| RhE             | Renohill-Buick loams, 9 to 20 percent slopes                   | 45.9         | 1.6%           |
| Ss              | Samsil-Shale outcrop complex                                   | 49.7         | 1.7%           |
| Su              | Sandy alluvial land                                            | 460.1        | 15.5%          |
| Ta              | Tassel-Rock outcrop complex                                    | 107.6        | 3.6%           |
| TeE             | Terry-Olney-Thedalund sandy loams, 5 to 20 percent slopes      | 585.7        | 19.8%          |

| Map Unit Symbol                    | Map Unit Name                                    | Acres in AOI   | Percent of AOI |
|------------------------------------|--------------------------------------------------|----------------|----------------|
| TrE                                | Truckton loamy sand, 5 to 20 percent slopes      | 95.9           | 3.2%           |
| WeB                                | Weld silt loam, 0 to 3 percent slopes            | 32.1           | 1.1%           |
| WrB                                | Weld-Deertrail silt loams, 0 to 3 percent slopes | 39.8           | 1.3%           |
| <b>Totals for Area of Interest</b> |                                                  | <b>2,961.4</b> | <b>100.0%</b>  |

# Farmland Classification—Arapahoe County, Colorado (Bijou Open Space)



Map Scale: 1:37,100 if printed on A portrait (8.5" x 11") sheet.

0 500 1000 2000 3000 Meters

0 1500 3000 6000 9000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84



**Natural Resources  
Conservation Service**

Web Soil Survey  
National Cooperative Soil Survey

6/3/2024  
Page 1 of 6

Farmland Classification—Arapahoe County, Colorado  
(Bijou Open Space)

## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

#### Soil Rating Polygons

-  Not prime farmland
-  All areas are prime farmland
-  Prime farmland if drained
-  Prime farmland if protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated
-  Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated and drained
-  Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

-  Prime farmland if subsoiled, completely removing the root inhibiting soil layer
-  Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
-  Prime farmland if irrigated and reclaimed of excess salts and sodium
-  Farmland of statewide importance
-  Farmland of statewide importance, if drained
-  Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if irrigated

-  Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if irrigated and drained
-  Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
-  Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60

-  Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
-  Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if warm enough
-  Farmland of statewide importance, if thawed
-  Farmland of local importance
-  Farmland of local importance, if irrigated

-  Farmland of unique importance
-  Not rated or not available

### Soil Rating Lines

-  Not prime farmland
-  All areas are prime farmland
-  Prime farmland if drained
-  Prime farmland if protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated
-  Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated and drained
-  Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Farmland Classification—Arapahoe County, Colorado  
(Bijou Open Space)

|  |                                                                                                                  |  |                                                                                                                                       |  |                                                                                                                                                            |                           |                                                                                                                  |  |                                                                                                                  |
|--|------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------|
|  | Prime farmland if subsoiled, completely removing the root inhibiting soil layer                                  |  | Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season   |  | Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium                                                                    |                           | Farmland of unique importance                                                                                    |  | Prime farmland if subsoiled, completely removing the root inhibiting soil layer                                  |
|  | Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60      |  | Farmland of statewide importance, if irrigated and drained                                                                            |  | Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season                         | <b>Soil Rating Points</b> |                                                                                                                  |  | Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60      |
|  | Prime farmland if irrigated and reclaimed of excess salts and sodium                                             |  | Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season |  | Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season |                           | Not prime farmland                                                                                               |  | Prime farmland if irrigated and reclaimed of excess salts and sodium                                             |
|  | Farmland of statewide importance                                                                                 |  | Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer                                    |  | Farmland of statewide importance, if warm enough                                                                                                           |                           | Prime farmland if protected from flooding or not frequently flooded during the growing season                    |  | Farmland of statewide importance                                                                                 |
|  | Farmland of statewide importance, if drained                                                                     |  | Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60        |  | Farmland of statewide importance, if thawed                                                                                                                |                           | Prime farmland if irrigated                                                                                      |  | Farmland of statewide importance, if drained                                                                     |
|  | Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season |  |                                                                                                                                       |  | Farmland of local importance                                                                                                                               |                           | Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season |  | Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season |
|  | Farmland of statewide importance, if irrigated                                                                   |  |                                                                                                                                       |  | Farmland of local importance, if irrigated                                                                                                                 |                           | Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season |  | Farmland of statewide importance, if irrigated                                                                   |

Farmland Classification—Arapahoe County, Colorado  
(Bijou Open Space)

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| <p> Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season</p> <p> Farmland of statewide importance, if irrigated and drained</p> <p> Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season</p> <p> Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer</p> <p> Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60</p> | <p> Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium</p> <p> Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season</p> <p> Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season</p> <p> Farmland of statewide importance, if warm enough</p> <p> Farmland of statewide importance, if thawed</p> <p> Farmland of local importance</p> <p> Farmland of local importance, if irrigated</p> | <p> Farmland of unique importance</p> <p> Not rated or not available</p> <p><b>Water Features</b></p> <p> Streams and Canals</p> <p><b>Transportation</b></p> <p> Rails</p> <p> Interstate Highways</p> <p> US Routes</p> <p> Major Roads</p> <p> Local Roads</p> <p><b>Background</b></p> <p> Aerial Photography</p> | <p>The soil surveys that comprise your AOI were mapped at 1:20,000.</p> <p>Please rely on the bar scale on each map sheet for map measurements.</p> <p>Source of Map: Natural Resources Conservation Service<br/>Web Soil Survey URL:<br/>Coordinate System: Web Mercator (EPSG:3857)</p> <p>Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.</p> <p>This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.</p> <p>Soil Survey Area: Arapahoe County, Colorado<br/>Survey Area Data: Version 19, Aug 24, 2023</p> <p>Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.</p> <p>Date(s) aerial images were photographed: Jun 9, 2021—Jun 12, 2021</p> <p>The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.</p> |
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## Farmland Classification

| Map unit symbol | Map unit name                                                  | Rating                                                                                                      | Acres in AOI | Percent of AOI |
|-----------------|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--------------|----------------|
| AdC             | Adena-Colby silt loams, 1 to 5 percent slopes                  | Farmland of statewide importance                                                                            | 246.5        | 8.3%           |
| AsD             | Ascalon sandy loam, 5 to 9 percent slopes                      | Farmland of statewide importance                                                                            | 14.7         | 0.5%           |
| BkB             | Beckton loam, 0 to 3 percent slopes                            | Not prime farmland                                                                                          | 284.0        | 9.6%           |
| BIB             | Bijou sandy loam, 0 to 3 percent slopes                        | Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60 | 12.0         | 0.4%           |
| BmB             | Bijou sandy loam, wet, 0 to 3 percent slopes                   | Prime farmland if irrigated and reclaimed of excess salts and sodium                                        | 18.8         | 0.6%           |
| BoE             | Blakeland loamy sand, 1 to 20 percent slopes                   | Not prime farmland                                                                                          | 27.1         | 0.9%           |
| BsB             | Bresser sandy loam, terrace, 0 to 3 percent slopes             | Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60 | 79.0         | 2.7%           |
| BvC             | Bresser-Truckton sandy loams, 3 to 5 percent slopes            | Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60 | 1.2          | 0.0%           |
| BvE             | Bresser-Truckton sandy loams, 5 to 20 percent slopes           | Not prime farmland                                                                                          | 67.3         | 2.3%           |
| CoC             | Colby silt loam, 1 to 5 percent slopes                         | Prime farmland if irrigated                                                                                 | 1.0          | 0.0%           |
| FrB             | Fort Collins loam, 0 to 3 percent slopes                       | Prime farmland if irrigated                                                                                 | 6.3          | 0.2%           |
| Gr              | Gravelly land                                                  | Not prime farmland                                                                                          | 35.2         | 1.2%           |
| HIB             | Heldt clay, 0 to 3 percent slopes                              | Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60 | 168.0        | 5.7%           |
| LsD             | Little-Samsil, gypsum, silty clay loams, 3 to 9 percent slopes | Not prime farmland                                                                                          | 161.2        | 5.4%           |

| Map unit symbol                    | Map unit name                                             | Rating                      | Acres in AOI   | Percent of AOI |
|------------------------------------|-----------------------------------------------------------|-----------------------------|----------------|----------------|
| Lv                                 | Loamy alluvial land                                       | Not prime farmland          | 80.0           | 2.7%           |
| NIB                                | Nunn loam, 1 to 3 percent slopes                          | Prime farmland if irrigated | 122.7          | 4.1%           |
| NrB                                | Nunn-Bresser-Ascalon complex, 0 to 3 percent slopes       | Prime farmland if irrigated | 51.0           | 1.7%           |
| RhD                                | Renohill-Buick loams, 3 to 9 percent slopes               | Not prime farmland          | 168.6          | 5.7%           |
| RhE                                | Renohill-Buick loams, 9 to 20 percent slopes              | Not prime farmland          | 45.9           | 1.6%           |
| Ss                                 | Samsil-Shale outcrop complex                              | Not prime farmland          | 49.7           | 1.7%           |
| Su                                 | Sandy alluvial land                                       | Not prime farmland          | 460.1          | 15.5%          |
| Ta                                 | Tassel-Rock outcrop complex                               | Not prime farmland          | 107.6          | 3.6%           |
| TeE                                | Terry-Olney-Thedalund sandy loams, 5 to 20 percent slopes | Not prime farmland          | 585.7          | 19.8%          |
| TrE                                | Truckton loamy sand, 5 to 20 percent slopes               | Not prime farmland          | 95.9           | 3.2%           |
| WeB                                | Weld silt loam, 0 to 3 percent slopes                     | Prime farmland if irrigated | 32.1           | 1.1%           |
| WrB                                | Weld-Deertrail silt loams, 0 to 3 percent slopes          | Not prime farmland          | 39.8           | 1.3%           |
| <b>Totals for Area of Interest</b> |                                                           |                             | <b>2,961.4</b> | <b>100.0%</b>  |

## Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

## Rating Options

*Aggregation Method:* No Aggregation Necessary

*Tie-break Rule:* Lower

## Land Capability Classification

The land capability classification of map units in the survey area is shown in this table. This classification shows, in a general way, the suitability of soils for most kinds of field crops (United States Department of Agriculture, Soil Conservation Service, 1961). Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit.

*Capability classes*, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

- Class 1 soils have slight limitations that restrict their use.
- Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.
- Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.
- Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.
- Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
- Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.
- Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.
- Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

*Capability subclasses* are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, 2*e*. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class 5 are subject to little or no erosion.

## Report—Land Capability Classification

| Land Capability Classification—Arapahoe County, Colorado |                  |                  |                          |           |
|----------------------------------------------------------|------------------|------------------|--------------------------|-----------|
| Map unit symbol and name                                 | Pct. of map unit | Component name   | Land Capability Subclass |           |
|                                                          |                  |                  | Nonirrigated             | Irrigated |
| AdC—Adena-Colby silt loams, 1 to 5 percent slopes        |                  |                  |                          |           |
|                                                          | 65               | Adena            | 4e                       | —         |
|                                                          | 25               | Colby            | 3c                       | —         |
| AsD—Ascalon sandy loam, 5 to 9 percent slopes            |                  |                  |                          |           |
|                                                          | 85               | Ascalon          | 4c                       | 4e        |
| BkB—Beckton loam, 0 to 3 percent slopes                  |                  |                  |                          |           |
|                                                          | 80               | Beckton          | 6s                       | —         |
| BIB—Bijou sandy loam, 0 to 3 percent slopes              |                  |                  |                          |           |
|                                                          | 85               | Bijou            | 4e                       | 3e        |
| BmB—Bijou sandy loam, wet, 0 to 3 percent slopes         |                  |                  |                          |           |
|                                                          | 90               | Bijou, wet       | 4w                       | —         |
| BoE—Blakeland loamy sand, 1 to 20 percent slopes         |                  |                  |                          |           |
|                                                          | 90               | Blakeland        | 6e                       | 4e        |
| BsB—Bresser sandy loam, terrace, 0 to 3 percent slopes   |                  |                  |                          |           |
|                                                          | 80               | Bresser, terrace | 4c                       | 2e        |
| BvC—Bresser-Truckton sandy loams, 3 to 5 percent slopes  |                  |                  |                          |           |
|                                                          | 55               | Bresser          | 4e                       | 3e        |
|                                                          | 30               | Truckton         | 4e                       | 3e        |
| BvE—Bresser-Truckton sandy loams, 5 to 20 percent slopes |                  |                  |                          |           |
|                                                          | 50               | Bresser          | 6e                       | 6e        |
|                                                          | 35               | Truckton         | 6e                       | —         |
| CoC—Colby silt loam, 1 to 5 percent slopes               |                  |                  |                          |           |
|                                                          | 80               | Colby            | 3c                       | —         |
| FrB—Fort Collins loam, 0 to 3 percent slopes             |                  |                  |                          |           |
|                                                          | 85               | Fort collins     | 3e                       | 3e        |

| Land Capability Classification--Arapahoe County, Colorado          |                  |                     |                          |           |
|--------------------------------------------------------------------|------------------|---------------------|--------------------------|-----------|
| Map unit symbol and name                                           | Pct. of map unit | Component name      | Land Capability Subclass |           |
|                                                                    |                  |                     | Nonirrigated             | Irrigated |
| Gr—Gravelly land                                                   |                  |                     |                          |           |
|                                                                    | 83               | Gravelly land       | 7e                       | —         |
| HIB—Heldt clay, 0 to 3 percent slopes                              |                  |                     |                          |           |
|                                                                    | 90               | Heldt               | 3c                       | —         |
| LsD—Little-Samsil, gypsum, silty clay loams, 3 to 9 percent slopes |                  |                     |                          |           |
|                                                                    | 55               | Little              | 4e                       | —         |
|                                                                    | 30               | Samsil, gypsum      | 6s                       | —         |
| Lv—Loamy alluvial land                                             |                  |                     |                          |           |
|                                                                    | 85               | Loamy alluvial land | 6w                       | 2w        |
| NIB—Nunn loam, 1 to 3 percent slopes                               |                  |                     |                          |           |
|                                                                    | 85               | Nunn                | 4e                       | 3e        |
| NrB—Nunn-Bresser-Ascalon complex, 0 to 3 percent slopes            |                  |                     |                          |           |
|                                                                    | 40               | Nunn                | 3c                       | —         |
|                                                                    | 25               | Bresser             | 4c                       | 2e        |
|                                                                    | 20               | Ascalon             | 3e                       | 2e        |
| RhD—Renohill-Buick loams, 3 to 9 percent slopes                    |                  |                     |                          |           |
|                                                                    | 65               | Renohill            | 4e                       | —         |
|                                                                    | 25               | Buick               | 4c                       | —         |
| RhE—Renohill-Buick loams, 9 to 20 percent slopes                   |                  |                     |                          |           |
|                                                                    | 67               | Renohill            | 6e                       | —         |
|                                                                    | 20               | Buick               | 4c                       | —         |
| Ss—Samsil-Shale outcrop complex                                    |                  |                     |                          |           |
|                                                                    | 60               | Samsil              | 6e                       | —         |
|                                                                    | 30               | Shale outcrop       | 8s                       | —         |
| Su—Sandy alluvial land                                             |                  |                     |                          |           |
|                                                                    | 95               | Sandy alluvial land | 6w                       | —         |
| Ta—Tassel-Rock outcrop complex                                     |                  |                     |                          |           |
|                                                                    | 70               | Tassel              | 7e                       | —         |
|                                                                    | 20               | Rock outcrop        | 8s                       | —         |

| Land Capability Classification--Arapahoe County, Colorado     |                  |                |                          |           |
|---------------------------------------------------------------|------------------|----------------|--------------------------|-----------|
| Map unit symbol and name                                      | Pct. of map unit | Component name | Land Capability Subclass |           |
|                                                               |                  |                | Nonirrigated             | Irrigated |
| TeE—Terry-Olney-Thedalund sandy loams, 5 to 20 percent slopes |                  |                |                          |           |
|                                                               | 40               | Terry          | 6e                       | —         |
|                                                               | 30               | Olney          | 6e                       | —         |
|                                                               | 20               | Thedalund      | 6e                       | —         |
| TrE—Truckton loamy sand, 5 to 20 percent slopes               |                  |                |                          |           |
|                                                               | 80               | Truckton       | 6e                       | —         |
| WeB—Weld silt loam, 0 to 3 percent slopes                     |                  |                |                          |           |
|                                                               | 80               | Weld           | 3c                       | 2e        |
| WrB—Weld-Deertrail silt loams, 0 to 3 percent slopes          |                  |                |                          |           |
|                                                               | 60               | Weld           | 3c                       | —         |
|                                                               | 25               | Deertrail      | 4s                       | —         |

## Data Source Information

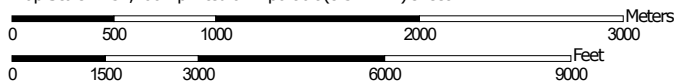
Soil Survey Area: Arapahoe County, Colorado

Survey Area Data: Version 19, Aug 24, 2023

## 104° 13' 27" W



104° 17' 28" W



104° 13' 27" W

## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Background

 Aerial Photography

### Soils

#### Soil Rating Polygons

-  Very limited
-  Somewhat limited
-  Not limited
-  Not rated or not available

#### Soil Rating Lines

-  Very limited
-  Somewhat limited
-  Not limited
-  Not rated or not available

#### Soil Rating Points

-  Very limited
-  Somewhat limited
-  Not limited
-  Not rated or not available

### Water Features

 Streams and Canals

### Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL:  
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Arapahoe County, Colorado  
Survey Area Data: Version 19, Aug 24, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 9, 2021—Jun 12, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Irrigation, Sprinkler (General)

| Map unit symbol | Map unit name                                      | Rating           | Component name (percent) | Rating reasons (numeric values)    | Acres in AOI | Percent of AOI |
|-----------------|----------------------------------------------------|------------------|--------------------------|------------------------------------|--------------|----------------|
| AdC             | Adena-Colby silt loams, 1 to 5 percent slopes      | Not limited      | Adena (65%)              |                                    | 246.5        | 8.3%           |
|                 |                                                    |                  | Colby (25%)              |                                    |              |                |
| AsD             | Ascalon sandy loam, 5 to 9 percent slopes          | Somewhat limited | Ascalon (85%)            | Slope, sprinkler irrigation (0.03) | 14.7         | 0.5%           |
|                 |                                                    |                  |                          | Low water holding capacity (0.01)  |              |                |
|                 |                                                    |                  | Stoneham (10%)           | Slope, sprinkler irrigation (0.03) |              |                |
|                 |                                                    |                  | Manter (5%)              | Low water holding capacity (0.04)  |              |                |
|                 |                                                    |                  |                          | Slope, sprinkler irrigation (0.03) |              |                |
| BkB             | Beckton loam, 0 to 3 percent slopes                | Very limited     | Beckton (80%)            | Excess Sodium (1.00)               | 284.0        | 9.6%           |
|                 |                                                    |                  |                          | Excess Salt (0.50)                 |              |                |
|                 |                                                    |                  |                          | Slow water movement (0.20)         |              |                |
| BIB             | Bijou sandy loam, 0 to 3 percent slopes            | Somewhat limited | Bijou (85%)              | Low water holding capacity (0.14)  | 12.0         | 0.4%           |
| BmB             | Bijou sandy loam, wet, 0 to 3 percent slopes       | Somewhat limited | Bijou, wet (90%)         | Low water holding capacity (0.24)  | 18.8         | 0.6%           |
| BoE             | Blakeland loamy sand, 1 to 20 percent slopes       | Somewhat limited | Blakeland (90%)          | Low water holding capacity (0.77)  | 27.1         | 0.9%           |
|                 |                                                    |                  |                          | Slope, sprinkler irrigation (0.61) |              |                |
| BsB             | Bresser sandy loam, terrace, 0 to 3 percent slopes | Not limited      | Bresser, terrace (80%)   |                                    | 79.0         | 2.7%           |

| Map unit symbol | Map unit name                                                 | Rating           | Component name (percent)           | Rating reasons (numeric values)    | Acres in AOI | Percent of AOI |
|-----------------|---------------------------------------------------------------|------------------|------------------------------------|------------------------------------|--------------|----------------|
| BvC             | Bresser-Truckton sandy loams, 3 to 5 percent slopes           | Not limited      | Bresser (55%)                      |                                    | 1.2          | 0.0%           |
| BvE             | Bresser-Truckton sandy loams, 5 to 20 percent slopes          | Somewhat limited | Bresser (50%)                      | Slope, sprinkler irrigation (0.90) | 67.3         | 2.3%           |
|                 |                                                               |                  |                                    | Low water holding capacity (0.00)  |              |                |
|                 |                                                               |                  | Truckton (35%)                     | Slope, sprinkler irrigation (0.90) |              |                |
|                 |                                                               |                  |                                    | Low water holding capacity (0.12)  |              |                |
| CoC             | Colby silt loam, 1 to 5 percent slopes                        | Not limited      | Colby (80%)                        |                                    | 1.0          | 0.0%           |
| FrB             | Fort Collins loam, 0 to 3 percent slopes                      | Not limited      | Fort Collins (85%)                 |                                    | 6.3          | 0.2%           |
| Gr              | Gravelly land                                                 | Very limited     | Gravelly land (83%)                | Slope, sprinkler irrigation (1.00) | 35.2         | 1.2%           |
|                 |                                                               |                  |                                    | Low water holding capacity (0.94)  |              |                |
| HIB             | Heldt clay, 0 to 3 percent slopes                             | Somewhat limited | Heldt (90%)                        | Surface clay (0.28)                | 168.0        | 5.7%           |
|                 |                                                               |                  |                                    | Slow water movement (0.20)         |              |                |
| LsD             | Litle-Samsil, gypsum, silty clay loams, 3 to 9 percent slopes | Somewhat limited | Litle (55%)                        | Excess Salt (0.50)                 | 161.2        | 5.4%           |
|                 |                                                               |                  |                                    | Slow water movement (0.20)         |              |                |
|                 |                                                               |                  |                                    | Depth to soft bedrock (0.00)       |              |                |
| Lv              | Loamy alluvial land                                           | Somewhat limited | Loamy alluvial land (85%)          | Occasional flooding (0.40)         | 80.0         | 2.7%           |
| NIB             | Nunn loam, 1 to 3 percent slopes                              | Somewhat limited | Nunn (85%)                         | Slow water movement (0.30)         | 122.7        | 4.1%           |
|                 |                                                               |                  | Haverson, very rarely flooded (2%) | Excess Salt (0.50)                 |              |                |

| Map unit symbol | Map unit name                                       | Rating           | Component name (percent)  | Rating reasons (numeric values)           | Acres in AOI | Percent of AOI |
|-----------------|-----------------------------------------------------|------------------|---------------------------|-------------------------------------------|--------------|----------------|
| NrB             | Nunn-Bresser-Ascalon complex, 0 to 3 percent slopes | Somewhat limited | Nunn (40%)                | Slow water movement (0.20)                | 51.0         | 1.7%           |
|                 |                                                     |                  | Ascalon (20%)             | Low water holding capacity (0.00)         |              |                |
| RhD             | Renohill-Buick loams, 3 to 9 percent slopes         | Somewhat limited | Renohill (65%)            | Depth to soft bedrock (0.46)              | 168.6        | 5.7%           |
|                 |                                                     |                  |                           | Slow water movement (0.20)                |              |                |
| RhE             | Renohill-Buick loams, 9 to 20 percent slopes        | Very limited     | Renohill (67%)            | Slope, sprinkler irrigation (1.00)        | 45.9         | 1.6%           |
|                 |                                                     |                  |                           | Depth to soft bedrock (0.80)              |              |                |
|                 |                                                     |                  |                           | Slow water movement (0.20)                |              |                |
|                 |                                                     |                  |                           | Low water holding capacity (0.01)         |              |                |
| Ss              | Samsil-Shale outcrop complex                        | Very limited     | Samsil (60%)              | Depth to soft bedrock (1.00)              | 49.7         | 1.7%           |
|                 |                                                     |                  |                           | Slope, sprinkler irrigation (1.00)        |              |                |
|                 |                                                     |                  |                           | Low water holding capacity (1.00)         |              |                |
|                 |                                                     |                  |                           | Slow water movement (0.20)                |              |                |
| Su              | Sandy alluvial land                                 | Somewhat limited | Sandy alluvial land (95%) | Low water holding capacity (0.91)         | 460.1        | 15.5%          |
|                 |                                                     |                  |                           | Frequent or very frequent flooding (0.70) |              |                |
| Ta              | Tassel-Rock outcrop complex                         | Very limited     | Tassel (70%)              | Depth to soft bedrock (1.00)              | 107.6        | 3.6%           |
|                 |                                                     |                  |                           | Slope, sprinkler irrigation (1.00)        |              |                |
|                 |                                                     |                  |                           | Low water holding capacity (0.96)         |              |                |
| TeE             | Terry-Olney-Thedalund sandy loams,                  | Somewhat limited | Terry (40%)               | Slope, sprinkler irrigation (0.90)        | 585.7        | 19.8%          |

| Map unit symbol                    | Map unit name                                    | Rating           | Component name (percent)  | Rating reasons (numeric values)    | Acres in AOI   | Percent of AOI |
|------------------------------------|--------------------------------------------------|------------------|---------------------------|------------------------------------|----------------|----------------|
|                                    | 5 to 20 percent slopes                           |                  |                           | Depth to soft bedrock (0.80)       |                |                |
|                                    |                                                  |                  |                           | Low water holding capacity (0.36)  |                |                |
|                                    |                                                  |                  | Olney (30%)               | Slope, sprinkler irrigation (0.40) |                |                |
|                                    |                                                  |                  |                           | Low water holding capacity (0.01)  |                |                |
|                                    |                                                  |                  | Thedalund (20%)           | Slope, sprinkler irrigation (0.90) |                |                |
|                                    |                                                  |                  |                           | Depth to soft bedrock (0.46)       |                |                |
| TrE                                | Truckton loamy sand, 5 to 20 percent slopes      | Somewhat limited | Truckton (80%)            | Slope, sprinkler irrigation (0.90) | 95.9           | 3.2%           |
|                                    |                                                  |                  |                           | Low water holding capacity (0.09)  |                |                |
| WeB                                | Weld silt loam, 0 to 3 percent slopes            | Somewhat limited | Weld (80%)                | Slow water movement (0.30)         | 32.1           | 1.1%           |
|                                    |                                                  |                  |                           |                                    |                |                |
|                                    |                                                  |                  | Rago, rarely flooded (2%) | Slow water movement (0.30)         |                |                |
|                                    |                                                  |                  | Pleasant, ponded (1%)     | Ponding (0.50)                     |                |                |
|                                    |                                                  |                  |                           | Slow water movement (0.30)         |                |                |
| WrB                                | Weld-Deertrail silt loams, 0 to 3 percent slopes | Somewhat limited | Weld (60%)                | Slow water movement (0.20)         | 39.8           | 1.3%           |
| <b>Totals for Area of Interest</b> |                                                  |                  |                           |                                    | <b>2,961.4</b> | <b>100.0%</b>  |

| Rating                             | Acres in AOI   | Percent of AOI |
|------------------------------------|----------------|----------------|
| Somewhat limited                   | 2,104.9        | 71.1%          |
| Very limited                       | 522.4          | 17.6%          |
| Not limited                        | 334.0          | 11.3%          |
| <b>Totals for Area of Interest</b> | <b>2,961.4</b> | <b>100.0%</b>  |

## Description

This interpretation evaluates a soil's limitation(s) for installation and use of sprinkler irrigation systems, excluding those equipped with closely spaced outlets on drops, which are covered by a different interpretation. The ratings are for soils in their natural condition and do not consider present land use.

Sprinkler irrigation systems apply irrigation water to a field through a series of pipes and nozzles and can be either solid set or mobile. Generally, this type of irrigation system is suitable for small grains, row crops, vegetables, and orchards.

The soil properties and qualities important in the design and management of sprinkler irrigation systems are depth, available water holding capacity, sodium adsorption ratio, surface coarse fragments, saturated hydraulic conductivity, salinity, slope, wetness, and flooding. The features that affect performance of the system and plant growth are surface rocks, salinity, sodium adsorption ratio, wetness, and available water holding capacity.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the interpretation. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Rating class terms indicate the extent to which the soils are limited by the soil features that affect the soil interpretation. Verbal soil rating classes are based on the highest numerical rating for the most limiting soil feature(s) considered in the rating process. "Not limited" (numerical value for the most restrictive feature = 0.00) indicates that the soil has no limiting features for the specified use. "Somewhat limited" (numerical value for the most restrictive feature = .01 to .99) indicates that the soil has limiting features for the specified use that can be overcome with proper planning, design, installation, and management. The effort required to overcome a soil limitation increases as the numerical rating increases. "Very limited" (numerical value for the most restrictive feature = 1.00) indicates that the soil has one or more very limiting features that can only be overcome with special planning, major soil modification, special design, or significant management practices.

Lesser soil restrictive features have a lower numerical value than the maximum used to rate the soil, and they are identified to provide the user with additional information about soil limitations for the specific use. Lesser soil restrictive features also need to be considered in planning, design, installation, and management.

The results of this interpretation are not designed or intended to be used in a regulatory manner.

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

## **APPENDIX C**

### **Enterprise Budgets**



## Northeastern Colorado - Dryland Winter Wheat Conventional Till- Fallow Rotation

### Estimated Production Costs & Returns

2023

#### GROSS RECEIPTS FROM PRODUCTION

| GROSS RECEIPTS                                                                                        | UNIT | PRICE  | YIELD | PER ACRE        | PER BU |              |
|-------------------------------------------------------------------------------------------------------|------|--------|-------|-----------------|--------|--------------|
| Hard Red Winter Wheat                                                                                 | bu   | \$7.45 | 45    | \$335.25        | \$7.45 | Your Farm    |
| Your Farm                                                                                             | bu   | \$7.45 | 23.7  | \$176.57        | \$7.45 | \$176.57     |
| Farm Bill payments were not included due to great variability between counties covered by this budget |      |        |       |                 |        |              |
| <b>Total Receipts</b>                                                                                 |      |        |       | <b>\$335.25</b> |        | <b>\$177</b> |

#### DIRECT COSTS

|                                        |         | COST PER |          |          |        |           |
|----------------------------------------|---------|----------|----------|----------|--------|-----------|
|                                        | UNIT    | UNIT     | QUANTITY | PER ACRE | PER BU | YOUR FARM |
| OPERATING PREHARVEST                   |         |          |          |          |        |           |
| Seed                                   |         |          |          |          |        |           |
| Seed                                   | dollars | 8.28     | 1.00     | 8.28     | 0.18   | 8.28      |
| Crop Protection                        |         |          |          |          |        |           |
| Fertilizer                             | dollars | 26.97    | 1        | 26.97    | 0.60   | 26.97     |
| Fungicide                              | dollars | 19.32    | 1        | 19.32    | 0.43   | 19.32     |
| Herbicide                              | dollars | 11.31    | 1        | 11.31    | 0.25   | 11.31     |
| Custom Application                     | dollars | 7.00     | 1        | 7.00     | 0.16   | 7         |
| Crop Insurance                         | dollars | 31.68    | 1        | 31.68    | 0.70   | 31.68     |
| Fuel                                   | dollars | 10.37    | 1        | 10.37    | 0.23   | 10.37     |
| Repair & Maintenance                   | dollars | 12.38    | 1        | 12.38    | 0.28   | 12.38     |
| Labor                                  | dollars | 3.25     | 1        | 3.25     | 0.07   | 3.25      |
| Interest (6 months @ 10%) <sup>2</sup> | dollars | 6.53     | 1        | 6.53     | 0.15   | 6.53      |
| Total Pre-Harvest Expenses             |         |          |          | \$137.09 | \$3.05 | \$137.09  |
| HARVEST COSTS                          |         |          |          |          |        |           |
| Fuel                                   | dollars | 6.43     | 1        | 6.43     | 0.14   | 6.43      |
| Repair & Maintenance                   | dollars | 4.36     | 1        | 4.36     | 0.10   | 4.36      |
| Labor                                  | dollars | 2.20     | 1        | 2.20     | 0.05   | 2.2       |
| Hauling <sup>1</sup>                   | bu      | 9.00     | 1        | 9.00     | 0.20   | 4.74      |
| Total Harvest Costs                    |         |          |          | \$21.99  | \$0.49 | \$17.73   |
| Total Operating Costs                  |         |          |          | \$159.08 | \$3.54 | \$154.82  |
| PROPERTY & OWNERSHIP COSTS             |         |          |          |          |        |           |
| General Farm Overhead                  | dollars | 10.10    | 1        | 10.10    | 0.22   | 10.1      |
| Machinery Ownership Costs              | dollars | 33.08    | 1        | 33.08    | 0.74   | 33.08     |
| Real Estate Taxes                      | dollars | 4.16     | 1        | 4.16     | 0.09   | 4.16      |
| Total Property & Ownership Costs       |         |          |          | \$47.34  | \$1.05 | \$47.34   |
| TOTAL DIRECT COSTS                     |         |          |          | \$206.42 | \$4.59 | \$202.16  |
| NET RECEIPTS BEFORE FACTOR PAYMENTS    |         |          |          | \$128.83 | \$2.86 | (\$25.60) |
| FACTOR PAYMENTS                        |         |          |          |          |        |           |
| Land (\$1,500 @ 3.7%) <sup>3</sup>     |         |          |          | 55.50    | 1.23   | 55.5      |
| RETURN TO MANAGEMENT & RISK            |         |          |          | \$73.33  | \$1.63 | (\$81.10) |

1 Hauling Machinery & Labor Charges= \$0.20/Bushel

2 Interest on Operating Capital is calculated on 1/2 of pre-harvest operating costs at 10%

3 Includes allocation of fallow acres in the rotation

#### BREAKEVEN ANALYSIS - PER ACRE RETURNS OVER TOTAL DIRECT COSTS (\$/ACRE)

| ALTERNATIVE YIELDS |       | ALTERNATIVE PRICES (\$/bushel) |          |          |          |
|--------------------|-------|--------------------------------|----------|----------|----------|
|                    |       | -25%                           | -10%     | 10%      | 25%      |
| -25%               | 33.75 | (\$17.84)                      | \$19.88  | \$45.02  | \$70.16  |
| -10%               | 40.50 | \$19.88                        | \$65.13  | \$95.31  | \$125.48 |
| BUSHELS PER ACRE   | 45.00 | \$45.02                        | \$95.31  | \$128.83 | \$162.36 |
| 10%                | 49.50 | \$70.16                        | \$125.48 | \$162.36 | \$199.23 |
| 25%                | 56.25 | \$107.88                       | \$170.74 | \$212.64 | \$254.55 |
|                    |       |                                |          | \$254.55 | \$317.41 |



## Northeastern Colorado - Dryland Proso Millet Reduced-Till in a Two-Crop in Three-Year Rotation

### Estimated Production Costs & Returns

2023

#### GROSS RECEIPTS FROM PRODUCTION

| GROSS RECEIPTS        | UNIT | PRICE   | YIELD | PER ACRE        | PER CWT |              |
|-----------------------|------|---------|-------|-----------------|---------|--------------|
| Proso Millet          | cwt  | \$12.98 | 14    | \$181.72        | \$12.98 | Your Farm    |
| Your Farm             | cwt  | \$12.98 | 24.7  | \$320.61        | \$12.98 | \$320.61     |
| <b>Gross Receipts</b> |      |         |       | <b>\$181.72</b> |         | <b>\$321</b> |

#### DIRECT COSTS

|                                            | UNIT    | COST PER UNIT | QUANTITY | PER ACRE         | PER CWT         | YOUR FARM       |
|--------------------------------------------|---------|---------------|----------|------------------|-----------------|-----------------|
| <b>OPERATING PREHARVEST</b>                |         |               |          |                  |                 |                 |
| Seed                                       |         |               |          |                  |                 |                 |
| Seed                                       | dollars | 3.59          | 1.00     | 3.59             | 0.26            | 3.59            |
| Crop Protection                            |         |               |          |                  |                 |                 |
| Fertilizer                                 | dollars | 16.13         | 1        | 16.13            | 1.15            | 16.13           |
| Herbicide                                  | dollars | 14.59         | 1        | 14.59            | 1.04            | 14.59           |
| Custom Application                         | dollars | 7.00          | 1        | 7.00             | 0.50            | 7               |
| Crop Insurance                             | dollars | 11.11         | 1        | 11.11            | 0.79            | 11.11           |
| Fuel                                       | dollars | 5.83          | 1        | 5.83             | 0.42            | 5.83            |
| Repairs & Maintenance                      | dollars | 6.57          | 1        | 6.57             | 0.47            | 6.57            |
| Labor                                      | dollars | 3.30          | 1        | 3.30             | 0.24            | 3.3             |
| Interest (6 months @ 10%) <sup>2</sup>     | dollars | 3.41          | 1        | 1.70             | 0.12            | 1.7             |
| Total Pre-Harvest Expenses                 |         |               |          | \$69.82          | \$4.99          | \$69.82         |
| <b>HARVEST COSTS</b>                       |         |               |          |                  |                 |                 |
| Fuel                                       | dollars | 11.73         | 1        | 11.73            | 0.84            | 11.73           |
| Repair & Maintenance                       | dollars | 10.56         | 1        | 10.56            | 0.75            | 10.56           |
| Labor                                      | dollars | 5.45          | 1        | 5.45             | 0.39            | 5.45            |
| Hauling <sup>1</sup>                       | bu      | 5.60          | 1        | 5.60             | 0.40            | 9.88            |
| Total Harvest Costs                        |         |               |          | \$33.34          | \$2.38          | \$37.62         |
| <b>Total Operating Costs</b>               |         |               |          | <b>\$103.16</b>  | <b>\$7.37</b>   | <b>\$107.44</b> |
| <b>PROPERTY &amp; OWNERSHIP COSTS</b>      |         |               |          |                  |                 |                 |
| General Farm Overhead                      | dollars | 10.10         | 1        | 10.10            | 0.72            | 10.1            |
| Machinery Ownership Costs                  | dollars | 33.08         | 1        | 33.08            | 2.36            | 33.08           |
| Real Estate Taxes                          | dollars | 4.16          | 1        | 4.16             | 0.30            | 4.16            |
| Total Property & Ownership Costs           |         |               |          | \$47.34          | \$3.38          | \$47.34         |
| <b>TOTAL DIRECT COSTS</b>                  |         |               |          | <b>\$150.50</b>  | <b>\$10.75</b>  | <b>\$154.78</b> |
| <b>NET RECEIPTS BEFORE FACTOR PAYMENTS</b> |         |               |          | <b>\$31.22</b>   | <b>\$2.23</b>   | <b>\$165.83</b> |
| <b>FACTOR PAYMENTS</b>                     |         |               |          |                  |                 |                 |
| Land (\$1,500 @ 3.7%) <sup>3</sup>         |         |               |          | 55.50            | 3.96            | 55.5            |
| <b>RETURN TO MANAGEMENT &amp; RISK</b>     |         |               |          | <b>(\$24.28)</b> | <b>(\$1.73)</b> | <b>\$110.33</b> |

1 Hauling Machinery & Labor Charges= \$0.40/CWT

2 Interest on Operating Capital is calculated on 1/2 of pre-harvest operating costs at 10%

3 Includes allocation of fallow acres in the rotation

#### BREAKEVEN ANALYSIS - PER ACRE RETURNS OVER TOTAL DIRECT COSTS (\$/ACRE)

|                    |       | ALTERNATIVE PRICES (\$/cwt) |           |           |          |          |
|--------------------|-------|-----------------------------|-----------|-----------|----------|----------|
|                    |       | -25%                        | -10%      | 10%       | 25%      |          |
| ALTERNATIVE YIELDS |       | \$9.74                      | \$11.68   | \$12.98   | \$14.28  | \$16.23  |
| -25%               | 10.50 | (\$48.29)                   | (\$27.84) | (\$14.21) | (\$0.58) | \$19.86  |
| -10%               | 12.60 | (\$27.84)                   | (\$3.31)  | \$13.05   | \$29.40  | \$53.93  |
| CWT                | 14.00 | (\$14.21)                   | \$13.05   | \$31.22   | \$49.39  | \$76.65  |
| 10%                | 15.40 | (\$0.58)                    | \$29.40   | \$49.39   | \$69.38  | \$99.36  |
| 25%                | 17.50 | \$19.86                     | \$53.93   | \$76.65   | \$99.36  | \$133.43 |



## Northeastern Colorado - Irrigated Corn

2023

### Estimated Production Costs & Returns

#### GROSS RECEIPTS FROM PRODUCTION

| GROSS RECEIPTS                                                                                        | UNIT | PRICE  | YIELD | PER ACRE       | PER BU |              |
|-------------------------------------------------------------------------------------------------------|------|--------|-------|----------------|--------|--------------|
| Corn                                                                                                  | bu   | \$6.87 | 201   | \$1,381        | \$6.87 | Your Farm    |
| Your Farm                                                                                             | bu   | \$6.87 | 128.8 | \$885          | \$6.87 | \$885        |
| Farm Bill payments were not included due to great variability between counties covered by this budget |      |        |       |                |        |              |
| <b>Gross Receipts</b>                                                                                 |      |        |       | <b>\$1,381</b> |        | <b>\$885</b> |

#### DIRECT COSTS

|                                            | UNIT    | COST PER UNIT | QUANTITY | PER ACRE        | PER BU        | YOUR FARM         |
|--------------------------------------------|---------|---------------|----------|-----------------|---------------|-------------------|
| <b>OPERATING PREHARVEST</b>                |         |               |          |                 |               |                   |
| Seed                                       |         |               |          |                 |               |                   |
| Seed                                       | acre    | 117.39        | 1.00     | 117.39          | 0.58          | 117.39            |
| Fertilizer                                 |         |               |          |                 |               |                   |
| N + P                                      | dollars | 106.21        | 1        | 106.21          | 0.53          | 106.21            |
| Custom Application                         | acre    | 7.00          | 1        | 7.00            | 0.03          | 7                 |
| Herbicide                                  |         |               |          |                 |               |                   |
| Chemicals                                  | dollars | 29.77         | 1        | 29.77           | 0.15          | 29.77             |
| Insecticide & Fungicide                    |         |               |          |                 |               |                   |
| Chemicals                                  | dollars | 23.66         | 1        | 23.66           | 0.12          | 23.66             |
| Irrigation                                 |         |               |          |                 |               |                   |
| Sprinkler Ownership                        | dollars | 67.20         | 1        | 67.20           | 0.33          | 67.2              |
| Sprinkler Energy                           | acre    | 82.64         | 1        | 82.64           | 0.41          | 82.64             |
| Irrigation Repairs                         | dollars | 87.38         | 1        | 87.38           | 0.43          | 87.38             |
| Labor                                      | hours   | 10.87         | 1        | 10.87           | 0.05          | 10.87             |
| Crop Consultant                            | acre    | 13.00         | 1        | 13.00           | 0.06          | 13                |
| Crop Insurance                             | dollars | 44.94         | 1        | 44.94           | 0.22          | 44.94             |
| Fuel                                       | dollars | 17.35         | 1        | 17.35           | 0.09          | 17.35             |
| Repairs & Maintenance                      | dollars | 10.20         | 1        | 10.20           | 0.05          | 10.2              |
| Interest (6 months @ 10%) <sup>2</sup>     | dollars | 30.88         | 1        | 30.88           | 0.15          | 30.88             |
| Total Pre-Harvest Expenses                 |         |               |          | \$648.49        | \$3.23        | \$648.49          |
| <b>HARVEST COSTS</b>                       |         |               |          |                 |               |                   |
| Fuel                                       | dollars | 4.20          | 1        | 4.20            | 0.02          | 4.2               |
| Repair & Maintenance                       | dollars | 6.45          | 1        | 6.45            | 0.03          | 6.45              |
| Labor                                      | dollars | 1.99          | 1        | 1.99            | 0.01          | 1.99              |
| Hauling <sup>1</sup>                       | bu      | 46.23         | 1        | 46.23           | 0.23          | 29.624            |
| Total Harvest Costs                        |         |               |          | \$58.87         | \$0.29        | \$42.26           |
| <b>Total Operating Costs</b>               |         |               |          | <b>\$707.36</b> | <b>\$3.52</b> | <b>\$690.75</b>   |
| <b>PROPERTY &amp; OWNERSHIP COSTS</b>      |         |               |          |                 |               |                   |
| General Farm Overhead                      | dollars | 12.42         | 1        | 12.42           | 0.06          | 12.42             |
| Machinery Ownership Costs                  | dollars | 66.88         | 1        | 66.88           | 0.33          | 66.88             |
| Real Estate Taxes                          | dollars | 21.47         | 1        | 21.47           | 0.11          | 21.47             |
| Total Property & Ownership Costs           |         |               |          | \$100.77        | \$0.50        | \$100.77          |
| <b>TOTAL DIRECT COSTS</b>                  |         |               |          | <b>\$808.13</b> | <b>\$4.02</b> | <b>\$791.52</b>   |
| <b>NET RECEIPTS BEFORE FACTOR PAYMENTS</b> |         |               |          | <b>\$572.74</b> | <b>\$2.85</b> | <b>\$93.33</b>    |
| <b>FACTOR PAYMENTS</b>                     |         |               |          |                 |               |                   |
| Land (\$8,500 @ 3.7%)                      |         |               |          | 314.50          | 1.56          | 314.5             |
| <b>RETURN TO MANAGEMENT &amp; RISK</b>     |         |               |          | <b>\$258.24</b> | <b>\$1.28</b> | <b>(\$221.17)</b> |

1 Hauling Machinery & Labor Charges= \$0.23/Bushel

2 Interest on Operating Capital is calculated on 1/2 of pre-harvest operating costs at 10%

#### BREAKEVEN ANALYSIS - PER ACRE RETURNS OVER TOTAL DIRECT COSTS (\$/ACRE)

|                    |        | ALTERNATIVE PRICES (\$/bushel) |          |          |            |            |
|--------------------|--------|--------------------------------|----------|----------|------------|------------|
|                    |        | -25%                           | -10%     |          | 10%        | 25%        |
| ALTERNATIVE YIELDS |        | \$5.15                         | \$6.18   | \$6.87   | \$7.56     | \$8.59     |
| -25%               | 150.75 | (\$31.39)                      | \$123.96 | \$227.52 | \$331.09   | \$486.44   |
| -10%               | 180.90 | \$123.96                       | \$310.37 | \$434.65 | \$558.93   | \$745.35   |
| BUSHELS PER ACRE   | 201.00 | \$227.52                       | \$434.65 | \$572.74 | \$710.83   | \$917.96   |
|                    | 10%    | \$331.09                       | \$558.93 | \$710.83 | \$862.72   | \$1,090.57 |
|                    | 25%    | \$486.44                       | \$745.35 | \$917.96 | \$1,090.57 | \$1,349.48 |



Consultants in Natural Resources and the Environment

## Natural Resources Assessment

### Bijou Basin Open Space

### Arapahoe County, Colorado



Prepared for—

Arapahoe County Open Spaces  
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Littleton, Colorado 80120

Prepared by—

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September 27, 2024

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Appendix A. Vegetation Species That May Occur on the Property.  
Appendix B. Wildlife Species That May Occur On the Property.  
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Appendix D. Technical Riparian Assessment.

# **Natural Resources Assessment**

## **Bijou Basin Open Space**

### **Arapahoe County, Colorado**

**September 27, 2024**

## **Introduction**

### **Purpose**

Wenk Associates contracted ERO Resources Corporation (ERO) to provide a natural resource assessment for the Bijou Basin Open Space Property in Arapahoe County, Colorado (Property) as part of the larger master planning process for the County's Open Spaces department.

The purpose of this Natural Resource Assessment report is to:

- Summarize the physical and ecological characteristics of the Property;
- Document and record existing conditions of the Property; and
- Provide recommendations regarding the use and development of the Property.

### **Property Location and Description**

The Property is located south of the Town of Byers, Colorado in Sections 7, 8, 18, and 19, Township 5 South, Range 61 West and Section 13, Township 5 South, Range 62 West of the 6th Principal Meridian (**Figure 1**). The UTM coordinates for the approximate center of the Property are 563530mE, 4385579mN of NAD 83: Zone 13N. The longitude/latitude of the Property is 104.259850°W/ 39.617608°N. The elevation of the Property ranges from 5,330 to 5,660 feet.

Bijou Basin is an approximately 2,854-acre unimproved open space property in Arapahoe County, located at the junction of Quincy Avenue (CR30) and Bradbury Road (CR173) approximately 5 miles south of Byers, CO. Approximately half of the property is encumbered by two conservation easements held by the Colorado Cattlemen's Agricultural Land Trust (same easement agreement in two separate locations on the Property). The property is bordered by over 12,000 acres of adjacent conserved lands including the West Bijou Conservation Easement to the east and our Mule Gulch Open Space property to the south.

### **Methods**

The Natural Resource Assessment began with a document review of supplied records, documents, and maps applicable to the Property. On May 17 and 20, 2024, ERO staff visited the Property and

documented ecological and physical characteristics (2024 site visits). During these site visits, documentation of vegetation species and plant communities, weeds, wildlife and birds, habitat for federally threatened or endangered species, and identification of high value grazing locations were compiled. A follow up site visit was conducted on July 11, 2024 to evaluate randomized plots of shortgrass prairie, and on August 23, 2024 to assess the riparian/floodplain corridor along Bijou Creek in the Property.

ERO consulted several organizations, agencies, and databases, including the Colorado Natural Heritage Program (CNHP), Colorado Historical Society, Office of Archaeology and Historic Preservation (OAHP), and Colorado Parks and Wildlife (CPW) Species Activity Mapping, pertaining to resources on the Property. Published information such as U.S. Geological Survey (USGS) and Natural Resources Conservation Service (NRCS) maps were also used to prepare the natural resource assessment. ERO also consulted County staff with knowledge of the Property.

## Existing Conditions

This section documents the basic physical and ecological characteristics and conditions of the Property. The Property is entirely undeveloped aside from two-track roads, fences, gates, and agricultural infrastructure. Cattle are currently grazed in three of the four set aside grazing units on the Property. Cattle use the grazing units approximately nine months out of the year (Units 1 and 3 are used May-October; Unit 2 is used September-November).

### Soils

The NRCS mapped 25 map units on the Property. The description for each soil and its series are given below. **Figure 2** shows the soil mapping for the Property. All soil information was gathered from the NRCS Soil Series Description query site (NRCS 2023) and the *Soil Survey of Arapahoe County, Colorado* (U.S. Department of Agriculture 2023).

#### **Adena-Colby silt loams, 1 to 5 percent slopes**

The Adena-Colby silt loam series consists of well-drained soils in drainageways and on hills. This soil is formed in linear eolian deposits. The slope ranges from 1 to 5 percent. The average annual precipitation is 12 to 16 inches, and the average annual air temperature is 50°F. These soils have a farmland classification of statewide importance.

#### **Ascalon sandy loam, 5 to 9 percent slopes**

The Ascalon sandy loam series consists of well-drained soils in interfluvies. This soil is formed in wind-reworked alluvium and/or calcareous sandy eolian deposits. The slope ranges from 5 to 9 percent. The average annual precipitation is 13 to 16 inches, and the average annual air temperature is 52°F. These soils have a farmland classification of statewide importance.

### **Beckton loam, 0 to 3 percent slopes**

The Olney Fine Sandy Loam series consists of moderately well-drained soils on flood plains, drainageways, and stream terraces. This soil is formed in alluvium. The slope ranges from 0 to 3 percent. The average annual precipitation is 15 inches, and the average annual air temperature is 48 to 50°F. These soils are not classified as prime farmland

### **Bijou sandy loam, 0 to 3 percent slopes**

The Bijou sandy loam series consists of very deep, well-drained soils in streams and stream terraces. This soil is formed from the Dawson formation alluvium. The slope ranges from 0 to 3 percent. The average annual precipitation is 14 inches, and the average annual air temperature is 46 to 52°F. These soils are considered Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60.

### **Bijou sandy loam, wet, 0 to 3 percent slopes**

The Bijou sandy loam series consists of very deep, poorly-drained soils in streams and stream terraces. This soil is formed from the Dawson formation alluvium. The slope ranges from 0 to 3 percent. The average annual precipitation is 14 inches, and the average annual air temperature is 46 to 52°F. This soil is considered prime farmland if irrigated and reclaimed of excess salts and sodium.

### **Blakeland loamy sand, 1 to 20 percent slopes**

The Blakeland loamy sand series consists of somewhat excessively drained soils on hills. This soil is formed from the Dawson formation eolian deposits. The slope ranges from 1 to 20 percent. The average annual precipitation is 14 to 16 inches, and the average annual air temperature is 46 to 48°F. These soils are not classified as prime farmland.

### **Bresser sandy loam, terrace, 0 to 3 percent slopes**

The Bresser sandy loam series consists of deep, well-drained soils in drainages and on stream terraces. This soil is formed in noncalcareous sandy alluvium and/or noncalcareous sandy eolian deposits. The slope ranges from 0 to 3 percent. The average annual precipitation is 12 to 15 inches, and the average annual air temperature is 46 to 52°F. These soils are considered Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60.

### **Bresser-Truckton sandy loams, 3 to 5 percent slopes**

This Bresser-Truckton sandy loam series consists of well-drained soils on playas, stream terraces, and drainageways. This soil is formed from noncalcareous sandy alluvium and/or noncalcareous sandy eolian deposits. The slope ranges from 3 to 5 percent. The average annual precipitation is 12 to 18 inches, and the average annual air temperature is 46 to 52°F. These soils are considered Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60.

### **Bresser-Truckton sandy loams, 5 to 20 percent slopes**

This Bresser-Truckton sandy loam series consists of deep, well-drained soils on plains. This soil is formed from noncalcareous sandy alluvium and/or noncalcareous sandy eolian deposits. The slope ranges from 5 to 20 percent. The average annual precipitation is 12 to 18 inches, and the average annual air temperature is 46 to 52°F. This soil is not classified as prime farmland.

### **Fort Collins loam, 0 to 3 percent slopes**

The Fort Collins loam series consists of very deep, well-drained soils on hills, plains, and alluvial fans. This soil is formed in mixed eolian sediments and alluvium. The slope ranges from 0 to 3 percent. The average annual precipitation is 5 inches, and the average annual air temperature is 47°F. These soils have a farmland classification of statewide importance. This soil is not classified as prime farmland.

### **Gravelly land**

The gravelly land series consists of poorly drained soils on hills and in drainageways. This soil is formed in Sandy or gravelly loamy. The average annual precipitation is 12 to 14 inches, and the average annual air temperature is 46 to 52°F. This soil is not classified as prime farmland.

### **Heldt clay, 0 to 3 percent slopes**

The Heldt clay series consists of well-drained soil in floodplains, drainageways and stream terraces. This soil is formed in eolian deposits. The slope ranges from 0 to 3 percent. The average annual precipitation is 11 to 15 inches, and the average annual air temperature is 46 to 59°F. These soils are considered Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60.

### **Litle-Samsil, gypsum, silty clay loams, 3 to 9 percent slopes**

The Litle-Samsil, gypsum, silty clay loam series consists of well-drained soils on ridges and hills. This soil is formed in eolian deposits. The slope ranges from 3 to 9 percent. The average annual precipitation is 13 to 15 inches, and the average annual air temperature is 48 to 52°F. This soil is not classified as prime farmland.

### **Loamy alluvial land**

The loamy alluvial land series consists of well-drained soils in floodplains, drainageways and streams. This soil is formed in loamy alluvium. The average annual precipitation is 11 to 15 inches, and the average annual air temperature is 48 to 52°F. This soil is not classified as prime farmland.

### **Nunn loam, 1 to 3 percent slopes**

The Nunn loam series consists of deep, well-drained soils on terraces. This soil is formed in pleistocene aged alluvium and/or eolian deposits. The slope ranges from 1 to 3 percent. The average annual precipitation is 13 to 16 inches, and the average annual air temperature is 46 to 54°F. These soils are classified as prime farmland if irrigated.

### **Nunn-Bresser-Ascalon complex, 0 to 3 percent slopes**

The Nunn-Bresser-Ascalon complex series consists of well-drained soils on playas and stream terraces and in streams. This soil is formed in eolian deposits. The slope ranges from 0 to 3 percent. The average annual precipitation is 12 to 18 inches, and the average annual air temperature is 46 to 57°F. These soils are classified as prime farmland if irrigated.

### **Renohill-Buick loams, 3 to 9 percent slopes**

This Renohill-Buick loam series consists of well-drained soils in drainageways. This soil is formed in loam silty and clayey alluvium. The slope ranges from 0 to 3 percent. The average annual precipitation is 11 to 16 inches, and the average annual air temperature is 45 to 48°F. This soil is not classified as prime farmland.

### **Renohill-Buick loams, 9 to 20 percent slopes**

This Renohill-Buick loam series consists of deep, well-drained soils. This soil is formed in clay loamy alluvium. The slope ranges from 9 to 20 percent. The average annual precipitation is 11 to 16 inches, and the average annual air temperature is 45 to 48°F. This soil is not classified as prime farmland.

### **Samsil-Shale outcrop complex**

The Samsil-Shale outcrop complex series consists of shallow, well-drained soils on rock outcrops. This soil is formed from calcareous loam clayey. The average annual precipitation is 14 inches, and the average annual air temperature is 48 to 52°F. This soil is not classified as prime farmland.

### **Sandy alluvial land**

The sandy alluvial land series consists of somewhat excessively drained soils in streams and drainageways. This soil is formed in sandy alluvium and/or loamy alluvium. The average annual precipitation is 10 to 14 inches, and the average annual air temperature is 48 to 52°F. This soil is not classified as prime farmland.

### **Tassel-Rock outcrop complex**

The Tassel-Rock outcrop complex series consists of well-drained soils on breaks. This soil is formed in Calcareous sandy and/or fine fine-loamy. The average annual precipitation is 12 to 19 inches, and the average annual air temperature is 46 to 52°F. This soil is not classified as prime farmland.

### **Terry-Olney-Thedalund sandy loams, 5 to 20 percent slopes**

The Terry-Olney-Thedalund sandy loam series consists of well-drained soils on hills. This soil is formed in residuum weathered from sandstone. The slope ranges from 5 to 20 percent. The average annual precipitation is 11 to 17 inches, and the average annual air temperature is 46 to 54°F. This soil is not classified as prime farmland.

### **Truckton loamy sand, 5 to 20 percent slopes**

The Truckton loamy sand series consists of well-drained soils in gullies and drainageways. This soil is formed in sand loamy eolian sands and/or loam sandy eolian sands. The slope ranges from 5 to 20 percent. The average annual precipitation is 12 to 18 inches, and the average annual air temperature is 46 to 52°F. This soil is not classified as prime farmland.

### **Weld silt loam, 0 to 3 percent slopes**

The Weld silt loam series consists of well-drained soils in interfluvies. This soil is formed in calcareous loess. The slope ranges from 0 to 3 percent. The average annual precipitation is 12 to 18 inches, and the average annual air temperature is 46 to 54°F. These soils are classified as prime farmland if irrigated.

### **Weld-Deertrail silt loams, 0 to 3 percent slopes**

The Weld-Deertrail silt loam series consists of well-drained soils. This soil is formed in loam silty and clayey eolian deposits. The slope ranges from 0 to 3 percent. The average annual precipitation is 13 to 17 inches, and the average annual air temperature is 46 to 55°F. This soil is not classified as prime farmland.

## **Hydrology**

The property is in the Town of Byers-West Bijou Creek watershed (101900110208). Conservation of the Property will continue to benefit local water quality and runoff (compared to development). The wetlands on the property are generally located along the Bijou creek corridor. Palustrine emergent wetlands are present along Bijou Creek. Some scrub-shrub wetlands are also present along small portions of Bijou Creek. Known wetland occurrence areas are located on **Figure 8**.

## **Vegetation**

### **General Vegetation Description**

The Property is located partially in the flat to rolling plains ecoregion (Chapman et al. 2006). This ecoregion occurs in the northeastern part of the state, where the land is mostly level and the soil consists mostly of silts. Areas of dryland farming and irrigated cropland are extensive throughout the ecoregion.

The Property is dominated by a mixture of prairie land, floodplains and croplands, with smaller areas of upland grasslands and disturbed areas. Shortgrass prairie covers the vast majority of the Property. Large areas of herbaceous cultivated cropland are also present on the property, generally on the east side of the Bijou Creek corridor. The northeastern most portion of the property contains a small area of Rocky Mountain foothill grassland community. The Western Great Plains riparian/floodplain community is located along the Bijou Creek corridor, extending out both east and west from the creek. The nonnative upland grassland community is located on the west side of the creek in an area previously used as

cultivated/cropland. Finally, the disturbed/developed community is associated with graded access roads and two-track roads.

Vegetation on the Property includes approximately 49.32 acres of Rocky Mountain Foothill Grassland, 1,732.96 acres of Western Great Plains Shortgrass Prairie, 488.21 acres of Western Great Plains Riparian/Floodplain, 419.32 acre of Herbaceous Planted/Cultivated, 77.93 acres of Nonnative Upland Grassland, and 38.28 acres of disturbed/developed areas. The vegetation communities are described below and shown on **Figure 3**. See **Table 1** below for the breakdown of vegetation communities on the property

**Table 1. Vegetation Communities.**

| Vegetation Community                     | Acreage               |
|------------------------------------------|-----------------------|
| Rocky Mountain Foothill Grassland        | 49.32                 |
| Western Great Plains Shortgrass Prairie  | 1,732.96              |
| Western Great Plains Riparian/Floodplain | 488.21                |
| Herbaceous Planted/Cultivated            | 419.32                |
| Nonnative Upland Grassland               | 77.93                 |
| Disturbed/Developed                      | 38.28                 |
| <b>Total Acreage</b>                     | <b>2,806.02 acres</b> |

#### ***Western Great Plains Riparian/Floodplain***

The Western Great Plains Riparian/Floodplain community is present along both sides of the Bijou Creek corridor. These areas include small fringes of emergent wetlands along the edge of the creek, and a larger riparian corridor extending east and west from the creek. Species found in the emergent wetland areas included sandbar willow (*Salix exigua*), common threesquare (*Schoenoplectus pungens*), and reed canarygrass (*Phalaris arundinacea*). The riparian corridor has an overstory dominated by plains cottonwood (*Populus deltoides*) trees with areas dominated by Russian olive trees (*Elaeagnus angustifolia*). The understory of the riparian area was mixed with smooth brome (*Bromus inermis*), cheatgrass (*Bromus tectorum*), field horsetail (*Equisetum arvense*) and many other species. This community is relatively undisturbed. The Western Great Plains Riparian/Floodplain community is described in more detail in the *Riparian Quality* section later in this report.

#### ***Western Great Plains Shortgrass Prairie***

The Western Great Plains shortgrass prairie community covers most of the western portion of the property as well as areas between the cultivated and riparian communities on the property. This community was very diverse, having a significant number of different species present. The dominant

species present included soapweed yucca (*yucca glauca*), blue grama (*Bouteloua gracilis*), sand dropseed (*Sporobolus cryptandrus*), and Canadian horseweed (*Conyza canadensis*). This community is relatively undisturbed except for impacts from existing fence-lines, dirt roads, and structures associated with cattle. This community is described in more detail in the *Grassland Quality* section later in this report.

#### **Rocky Mountain Foothill Grassland**

The Rocky Mountain Foothill Grassland community consists of one area on the property, it is situated in between the riparian floodplain and pastureland that is currently being used. This community consists of a mixed-grass prairie land that is dominated by mountain muhly (*Muhlenbergia montana*), blue grama, western wheatgrass (*Pascopyrum smithii*), and green needlegrass (*Nassella viridula*). This community is relatively undisturbed except for impacts from existing fence-lines.

#### **Herbaceous Planted/Cultivated**

The herbaceous planted/cultivated community occurs on the eastern side of Bijou Creek, aside from one small area in the north-central portion of the property. The portion of this community located east of Bijou Creek is currently utilized for active agricultural production. The small portion of this community in the north-central portion of the property appears to have previously been used for agricultural production, though it is no longer being actively used, it is likely to transition to nonnative upland grasslands in the near future. The two main species being grown consist of winter wheat (*Triticum aestivum*) and millet (*Setaria* sp.).

#### **Disturbed/Developed Community**

The disturbed/developed community is limited to two-tracks, and gravel access roads. These areas appear to be regularly disturbed and are devoid of vegetation, with the vegetation around them consisting of nonnative species including cheatgrass (*Bromus tectorum*).

#### **Nonnative upland grassland**

The nonnative upland grasslands on the property consist of areas that were previously cultivated lands and have transitioned to a mixture of nonnative upland species with some of the planted species remaining. This community is dominated by alfalfa (*Medicago sativa*), prickly Russian thistle (*Salsola tragus*), Canadian horseweed (*Conyza canadensis*), and smooth brome. This community is relatively undisturbed aside from gravel road running through it.

#### **State Noxious Weeds**

No List A species were identified on the Property during the 2024 site visit. Six CDOA Noxious Weed List B species and four List C species were documented on the Property during the 2024 site visits (CDOA 2015). Noxious weed species are designated by the State of Colorado commissioner of agriculture, in consultation with the state noxious weed advisory committee, local governments, and other interested parties.

Six List B noxious weed species listed by the state occur on the Property. List B noxious weed species are species for which the commissioner of agriculture, in consultation with the state noxious weed advisory committee, local governments, and other interested parties, develops and implements state noxious weed management plans designed to stop the continued spread of these species. List B species that occur on the Property include:

- Canada thistle (*Cirsium arvense*)
- Scotch thistle (*Onopordum acanthium*)
- Musk thistle (*Carduus nutans*)
- Russian olive (*Elaeagnus angustifolia*)
- Spotted knapweed (*Centaurea stoebe*)
- Diffuse knapweed (*Centaurea diffusa*)

Four List C noxious weed species listed by the state occur on the Property. List C weed species are species for which the commissioner of agriculture, in consultation with the state noxious weed advisory committee, local governments, and other interested parties, develops and implements state noxious weed management plans designed to support the efforts of local governing bodies to facilitate more effective integrated weed management on private and public lands. The goal of such plans is not to stop the continued spread of these species but to provide additional education, research, and biological control resources to jurisdictions that choose to require management of List C species. List C species that occur on the Property include:

- Cheatgrass (*Bromus tectorum*)
- Common mullein (*Verbascum thapsus*)
- Field bindweed (*Convolvulus arvensis*)
- Puncturevine (*Tribulus terrestris*)

### **Federally Threatened, Endangered, and Candidate Plant Species**

Federally threatened and endangered plant species are protected under the Endangered Species Act of 1973 (ESA), as amended (16 United States Code 1531 et seq.). Significant adverse effects on a federally listed plant species or its habitat require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 or 10 of the ESA. Candidate species are species not yet listed as threatened or endangered but that may be listed in the future. The Service indicates that two threatened plant species potentially occur in Arapahoe County: Ute ladies'-tresses orchid (*Spiranthes diluvialis*), and western prairie fringed orchid (*Platanthera praeclara*) (Service 2024).

Ute ladies'-tresses orchid occurs at elevations below 7,800 feet in moist to wet alluvial meadows, in floodplains of perennial streams, and around springs and lakes where the soil is seasonally saturated within 18 inches of the surface (Service 1992). Generally, the species occurs where the vegetative cover is relatively open and not overly dense or overgrazed. In Colorado, the Service requires surveys in areas of suitable habitat on the 100-year floodplain of the South Platte River, Fountain Creek, the Yampa River, and their perennial tributaries or in any area with suitable habitat in Boulder and Jefferson Counties

(Service 1992). Although few wetlands occur on the Property, they are not conducive to the establishment of Ute ladies'-tresses orchid because of their poor state and disconnection from the creek corridor.

The western prairie fringed orchid is only known to occur in tallgrass prairies in Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and Manitoba, Canada. This species is not currently known to occur in Colorado, though its range does cover a portion of the state. Its known habitat consists of ecosystems with large, flat areas of grasses, specifically tallgrass prairies and sedge meadows. The Property is not conducive to the establishment of western prairie fringed orchid because the Property is located outside where the species is currently known to be found and lacks the tallgrass prairie habitat associated with the species.

### **Colorado Natural Heritage Program Rare Plants and Communities**

The Colorado Natural Heritage Program (CNHP) collects data on rare and imperiled species, subspecies and natural communities in Colorado. Potential Conservation Areas (PCAs) are derived from these data. A PCA represents CNHP's best estimate of the primary area supporting the long-term survival of targeted species, subspecies and natural communities (CNHP 2024). The Property contains one PCA along Bijou Creek which is designated as B4, an area of Moderate Biodiversity Significance.

CNHP tracks several global or state critically imperiled (G1 or S1) or imperiled (G2 or S2) plants and plant communities that have potential to occur on the Property. No rare plants or plant communities have been identified by the CNHP on the Property, though there are two G3 Elements Present which means there is a global species as well as a global community that is vulnerable to extirpation or extinction. These communities and species are:

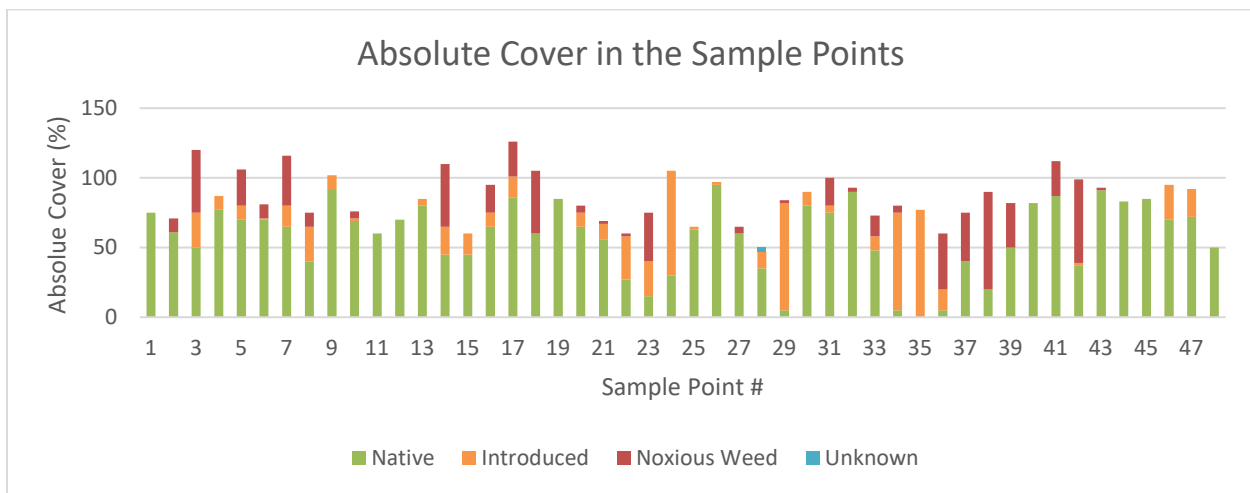
- Floodplain Woodland including the Eastern Cottonwood (*Populus deltoides*), Peachleaf willow (*Salix amygdaloides*), and Sandbar willow (*Salix exigua*, interior)
- Engelmann Goldenweed (*Oenopsis engelmannii*)

### **Grassland Quality**

Additional surveys were conducted on July 11, 2024, to better understand the composition of the shortgrass prairie in each of the four grazing units. ERO staff placed 48 random plots (shown on **Figure 3**) throughout the Western Great Plains shortgrass prairie community west of Bijou Creek in the Property and recorded the absolute aerial cover of individual species within a 1 square meter sampling frame (quadrat). Aerial cover (cover hereafter) is an estimate, expressed as a percentage, of the amount of shadow that would be cast by the vegetation layer if the sun were directly over the plot area. The data from the Western Great Plains shortgrass prairie community quadrat surveys are in **Appendix C**.

### Sample Point Summary

The average absolute cover in the sample points resulted in 85 percent overall cover, 59 percent native cover, 21 percent introduced cover, and 23 percent noxious weed cover. The sample points with the highest absolute native cover are Quadrat 26 (Unit 4, 95 percent cover), Quadrat 9 (Unit 1, 92 percent cover), and Quadrat 32 (Unit 4, 90 percent cover); whereas the sample points with the lowest absolute cover are Quadrat 35 (Unit 4, no native cover), and Quadrats 29, 34, and 36, each with 5 percent native cover (all in Unit 4). The results for each sample point are in **Appendix C** and summarized in **Graph 1** below.



**Graph 1. Absolute Cover in the Sample Points.**

### Unit Summary

As summarized in **Table 2** and **Graph 2**, the overall Property had an average absolute total cover of 85 percent, with Unit 1 having the highest average absolute cover with 98 percent, followed by Unit 3, then Unit 4, and Unit 2 had the lowest average absolute cover at 70 percent. As shown on **Figure 5**, the highest cover shortgrass prairie areas are in the northern portion of Unit 1. Other densely populated shortgrass prairie areas are in Unit 3 on the hillslopes in the northwest region of the unit and in the central portion of Unit 4.

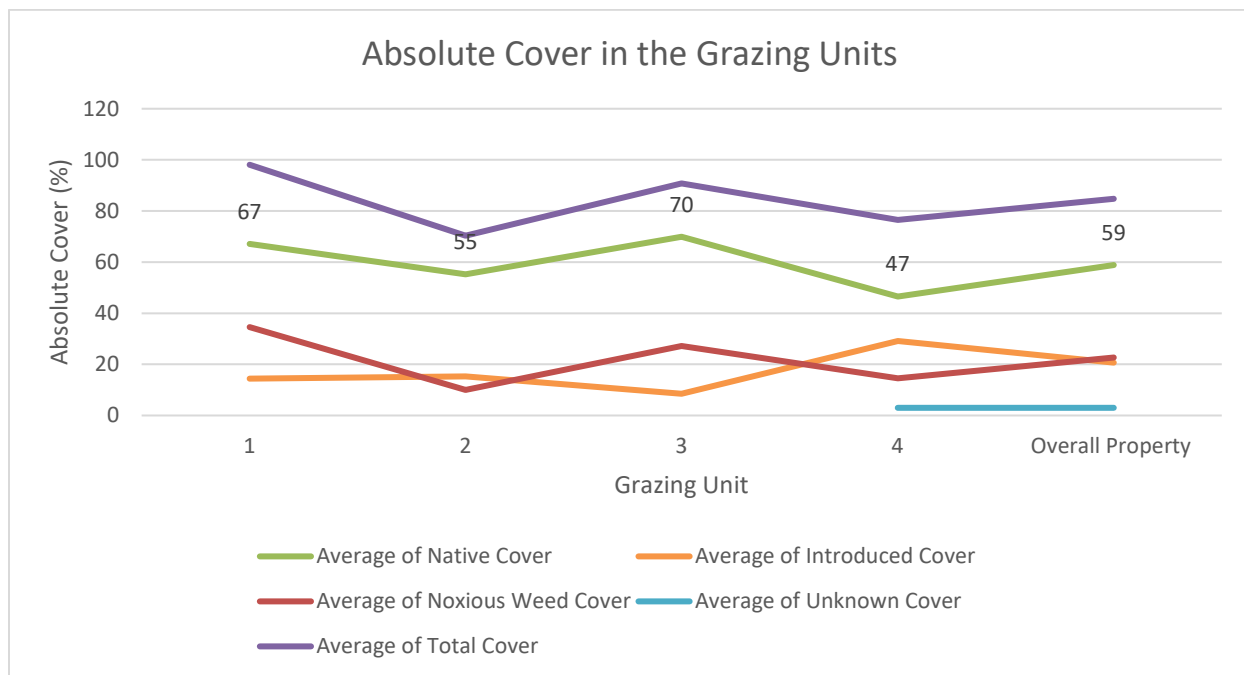
Overall, the average absolute native cover in the Property was 59 percent, with Unit 3 having the highest percent (70 percent), then Unit 1, then Unit 2, and lastly, Unit 4 with 47 percent (**Table 2** and **Graph 2**). The most dense areas of absolute native cover are in Units 1 and 3, shown on **Figure 6**.

Noxious weeds were also assessed in the plots (shown on **Figure 7**) and it was determined that areas of densest weed infestations were in Unit 1 with other areas of infestation in the northwest corner and along the southern boundary of Unit 3 and in the southwest corner of Unit 4. Overall, the average

absolute cover of noxious weeds in the Property based on the quadrat surveys was 23 percent, with Unit 1 having the highest percent (35 percent), then Unit 3, then Unit 4, and lastly, Unit 2 with 10 percent (**Table 2** and **Graph 2**). Of note, both List B and List C listed noxious weeds were observed in Unit 1 and Unit 4, whereas only List C noxious weeds were observed in Unit 2 and Unit 3.

**Table 2. Absolute Cover in the Grazing Units.**

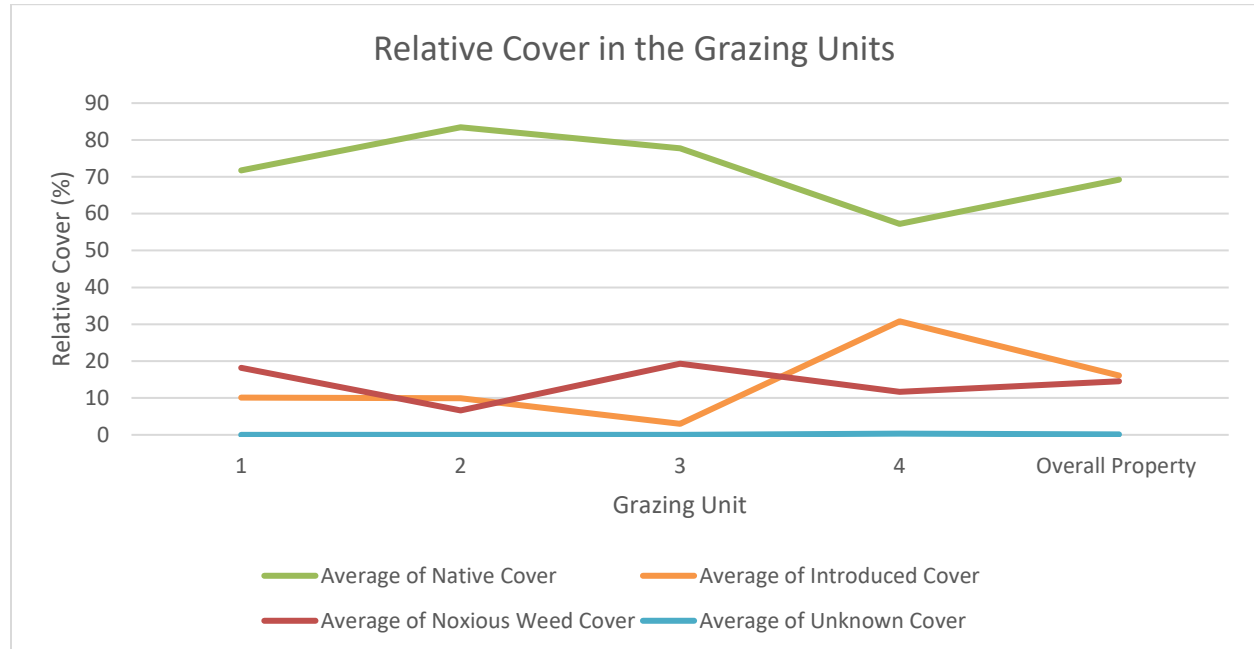
| Grazing Unit     | Average Absolute Cover (%) |            |               |         |       |
|------------------|----------------------------|------------|---------------|---------|-------|
|                  | Native                     | Introduced | Noxious Weeds | Unknown | Total |
| 1                | 67                         | 14         | 35            | 0       | 98    |
| 2                | 55                         | 15         | 10            | 0       | 70    |
| 3                | 70                         | 9          | 27            | 0       | 91    |
| 4                | 47                         | 29         | 15            | 3       | 77    |
| Overall Property | 59                         | 21         | 23            | 3       | 85    |



**Graph 2. Absolute Cover in the Grazing Units**

Based on field observations and an analysis of relative cover in the quadrats, the highest quality shortgrass prairie is in Unit 2, because it has the highest average native cover, and the lowest average cover of noxious weeds (**Graph 3**). The overall relative native cover is also high in Unit 1 and Unit 3; however, ERO determined that these units also have the highest abundance of noxious weeds (**Graph 3**).

Unit 4 had the lowest average relative cover of native species, as well as a moderate abundance of noxious weeds.



**Graph 3. Absolute Cover in the Grazing Units**

## Riparian Quality

### General Riparian Description

The riparian quality along Bijou Creek varies throughout the corridor but is generally in fair to good condition. Wetland reestablishment and riparian tree and shrub recruitment were observed in areas close to the creek channel; however, further from the channel, a higher amount of senescence (degradation) and tree die-off was observed, likely due to a combination of aggradation and degradation of the stream system from high flow events that has resulted in erosion and disconnection from the floodplain. General observations from the riparian assessment are described below, and details from the Technical Riparian Assessment are discussed in the following section.

- More canopy senescence further from the channel, with up to 70-90 percent where flooding and incision has disconnected floodplain from the main channel. This is present particularly in the downstream (northern) half of the project area in Unit 2 and the northwestern portion of Unit 4 along the old oxbow (**Figure 8**).
- The downstream portion of creek corridor has more sediment in the riparian terraces with less herbaceous cover, dominated by sweetclover (*Melilotus officinalis*), smooth brome, and western wheatgrass, with intermittent areas where showy milkweed (*Asclepias speciosa*) is establishing.

- The channel in the downstream portion of the creek corridor is narrower and shows signs of intermittent wetland establishment (about 30 percent cover in pockets and fringes) (shown on **Figure 8**). This area is dominated by a mixture of native and invasive species, including barnyard grass (*Echinochloa crus-galli*), annual rabbitsfoot grass (*Polypogon monspeliensis*), common threesquare, and some plains cottonwood seedlings.
- Generally, the channel is wider and drier in the central portion of the project area. Signs of riparian recruitment is minimal but there is more diverse and native vegetative cover. There is generally less senescence in the tree canopy.
- Channels with flows were observed in the upstream (southern) portion of the creek corridor in the Property. Wetlands are reestablishing in this area with higher cover of native species, including cottonwood and some sandbar willow seedlings and saplings. Overall, there is more riparian shrub and tree recruitment and less senescence in the tree canopy.

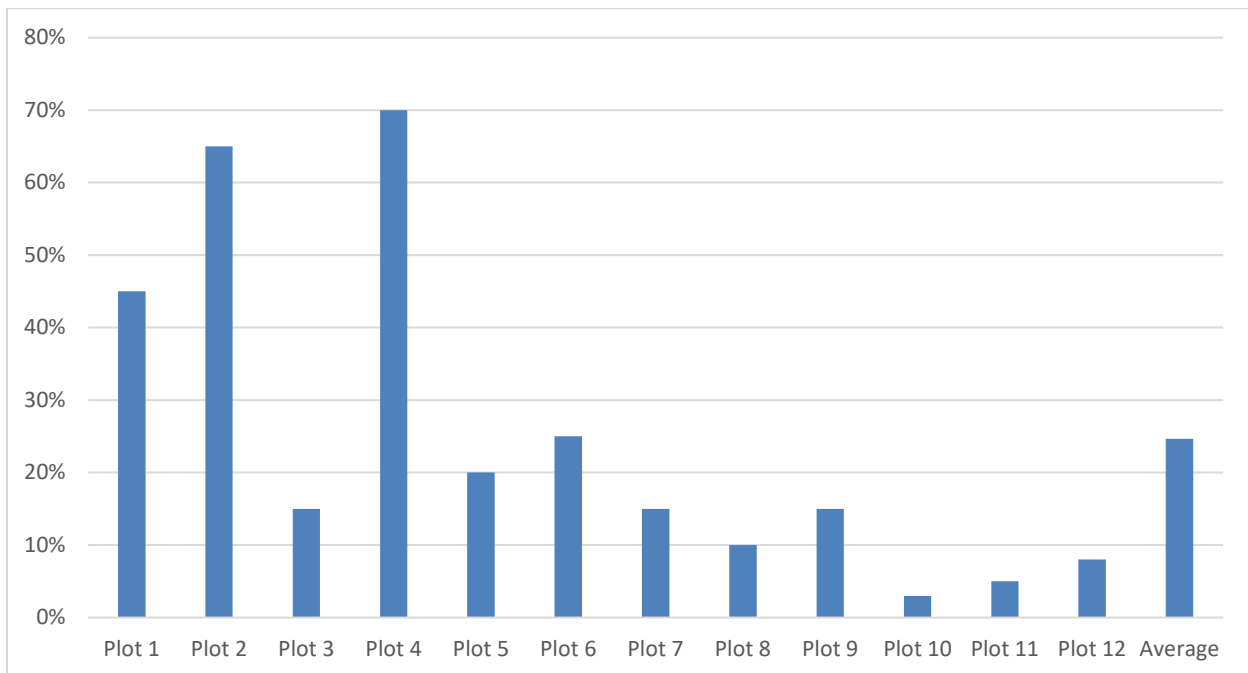
### Technical Riparian Assessment Findings

ERO randomly assigned 12 plots in Unit 4 in the Western Great Plains Riparian/Floodplain community (shown on **Figure 8**) along the creek corridor to assess the riparian quality. Within each plot, ERO evaluated general conditions and various bird habitat specific characteristics, including specific age-class and structural characteristics of the tree and shrub strata. Additionally, to evaluate the riparian quality, ERO scored habitat attributes or function metrics for Preble's meadow jumping mouse (*Zapus hudsonius preblei*; Preble's) because this species is an indicator species of healthy riparian ecosystems. The results are summarized below and the data from the Technical Riparian Assessment are in **Appendix D**.

Additionally, the riparian quality was generally assessed in grazing Unit 2, though not plots were established. Channel incision within this unit was between 4- to 8-feet high, with sparse herbaceous cover on the riparian terraces dominated by sweet clover, western wheatgrass, smooth brome, and showy milkweed. The overstory is dominated by plains cottonwood and Russian olive with about 80-90 percent live canopy. There was no flowing water in the channel though about 30 percent cover of wetlands reestablishing in this area were dominated by a mixture of native and introduced herbaceous species and cottonwood seedlings. Compared to the stream and riparian corridor in Unit 4, the channel in Unit 2 is narrower, with smaller and more sporadic patches of wetlands. Along the narrowed channel, the terraces are higher and drier, but generally consist of similar herbaceous species and composition as the upper terraces in Unit 4. There was more tree senescence in Unit 4, and Russian olives, a List B, noxious weed were more prevalent. Additionally, it appeared that there was more damage from the high flow events along the upper terraces on the west side of Bijou Creek, evidenced by sediment deposition and drift deposits.

#### *Tree Canopy*

- Nine of the 12 plots had a multi-age, open canopy. The three remaining plots (Plot 3, Plot 6, and Plot 12) had a single-age open canopy. The plots with single-age open canopies consisted primarily of young trees and saplings.
- Plots with the most deterioration evaluated by percent senescence (**Graph 4**) were observed at the downstream end of Unit 4.
- There were few areas adjacent to the Bijou Creek channel that provided cavities as potential nesting opportunities for birds due to their size. Typically, larger diameter trees provide nesting places and cover for various birds.
- Tree regeneration was observed at Plot 4 and Plot 5, and Plot 7 through Plot 12.



**Graph 4. Senescence in Tree Canopy (percent die-off)**

#### *Shrub Layer*

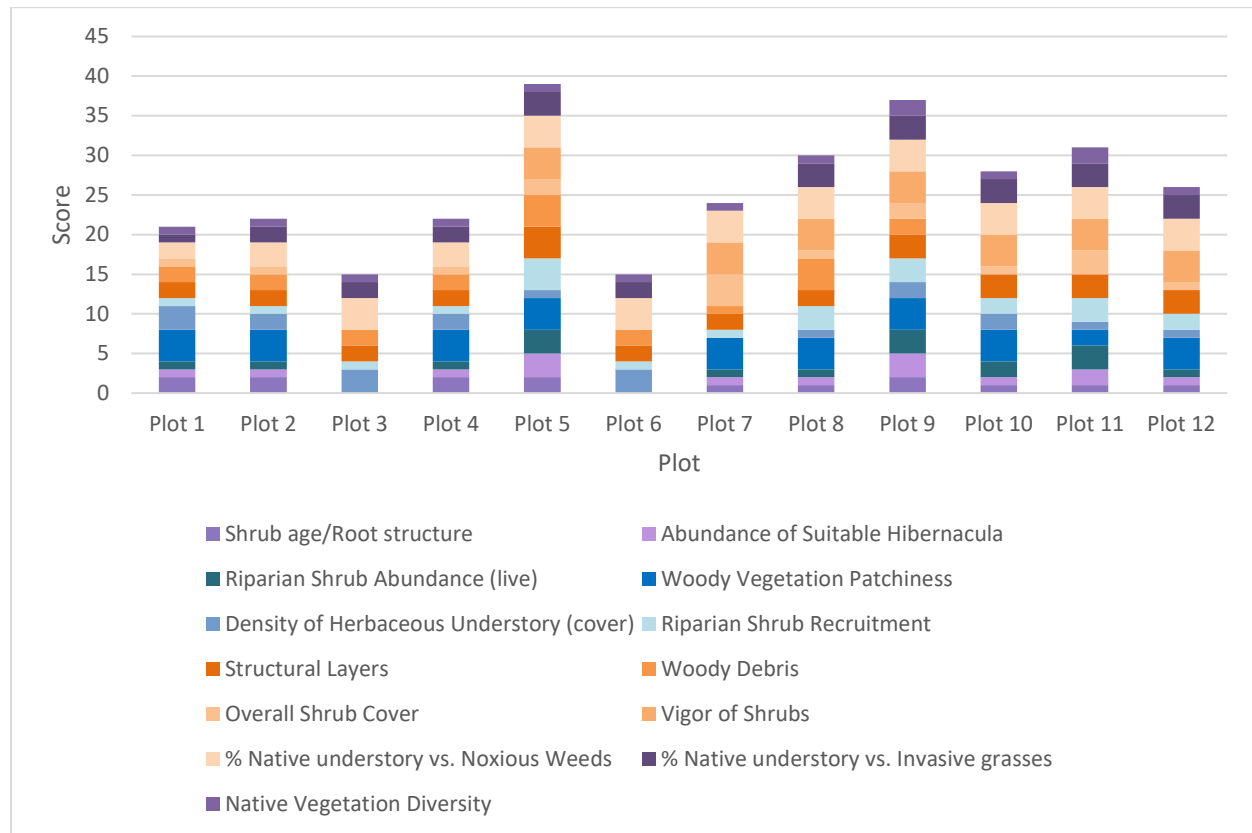
- Two of the 12 plots had a multi-age, open shrub canopy (Plot 5 and Plot 9), another two plots had a single age, open shrub canopy (Plot 11 and Plot 12), and the eight remaining plots did not have a shrub layer present (Plot 1 through Plot 4, Plot 6 through Plot 8, and Plot 10).
- Plots with the most deterioration evaluated by percent senescence (**Graph 4**) were observed at the downstream end of the Property.

- There was little senescence (less than 12 percent) observed in the shrub layer across the evaluated plots. Most of the shrub layer that was observed along the channel was new growth, rather than established, mature shrubs.
- Shrub regeneration was observed at Plot 5, Plot 9, Plot 11, and Plot 12.

#### *Habitat Attributes*

The Preble's habitat attributes assessment evaluated the general landscape characteristics (e.g., hydrology, geomorphology, and vegetation class) of the community and gives a rating for Preble's and habitat attributes. Within each sampling plot, Preble's and habitat attributes were generally rated from 0 to 4, ranging from areas that do not provide the attribute being measured (rating of 0) to areas that provide the optimal level of the attribute being measured (rating of 4). **Graph 5** on the next page shows the results of the 13 habitat attributes that were evaluated during the technical riparian assessment.

- Overall, Plot 5, which is located on an outside bend of Bijou Creek on a low terrace, scored highest. Plains cottonwood and sandbar willows saplings are establishing at this plot and there is a healthy tree canopy.
- The upstream plots (Plot 8 through Plot 12) scored higher than the rest of the plots, except for Plot 5. Generally, these plots were scored as "fair" or "good" for riparian shrub recruitment and vegetative structural layers, and in the "good" to "optimal" range for woody vegetation patchiness, shrub vigor, and cover of native understory vs. noxious weeds.
- Plot 3 and Plot 6 scored the lowest. These plots were collected on terraces directly adjacent to the channel in areas where there was an abrupt transition to uplands dominated by smooth brome with little diversity or structure, and no shrubs present.



**Graph 5. Riparian Habitat Attribute Assessment Results**

### Grazing Effects on Riparian Quality

Cattle are currently allowed to graze in the riparian areas of grazing Unit 2 and calving operations have occurred in this area in the past. During the summer 2024 site visit, evidence of grazing was more evident in the higher terraces whereas closer to the creek channel it was less obvious and was limited to light herbivory observed to willows on herbaceous vegetation. Adverse effects of grazing in the riparian areas can be contributed to the time of year and length of time cattle are present in these areas. Unmanaged grazing in riparian and wetland areas could lead to detrimental impacts from the alteration of geomorphology, soil/water chemistry, and vegetation. Though fencing could help keep cattle away from sensitive riparian areas, if the size of the areas where cattle have access is reduced, then these areas could become further degraded because of a higher amount of trampling and grazing.

## Wildlife

### General Wildlife Description

The Property provides a large, intact area of plains riparian and shortgrass prairie habitat, and contributes to a network of protected lands in eastern Arapahoe County. Existing agricultural leases have disturbed wildlife habitat in some areas with higher noxious weed concentrations. Wildlife species

observed during the 2024 site visit included house wren, house sparrow, American robin, red-tailed hawk, western meadowlark, western kingbird, yellow warbler, brown headed cowbird, Bullock's oriole, red-winged blackbird, turkey vulture, lark bunting, American kestrel, northern mockingbird, eastern kingbird, killdeer, western tanager, blue jay, house finch, European starling, mourning dove, black tailed prairie dog, mule deer, pronghorn, common collared lizard, and porcupine.

The presence of a large number of pronghorn is indicative of the fair to good quality grassland habitat present especially on the north portions of the Property. Abundant grass and forb production is essential for pronghorn populations to thrive, and the quality and quantity of vegetation appear to be major factors affecting pronghorn densities and production (Rickel 2005). Undisturbed shortgrass prairie areas produce the highest quality of forage for pronghorn and mule deer on the Property which is where the largest concentration of sightings were observed.

**Figure 9** presents a series of wildlife habitat maps for wildlife species that may be economically important, federally listed, state-listed, or species of concern (CPW 2020). These maps include the following:

- Bald eagle – overall range, winter forage, and winter concentration area.
- Wild turkey – production area
- Mule deer – winter range, overall range, winter concentration area, resident population area, concentration area, migration corridors, and severe winter range
- White-tailed deer – overall range, winter range, and concentration area
- Pronghorn – overall range, winter concentration area and severe winter range
- Aquatic Native Species Conservation Waters

A list of wildlife species that may occur on the Property was compiled from the CPW Species Activity Mapping (CPW 2020) and is provided in **Appendix B**.

### **Federally Threatened, Endangered, and Candidate Wildlife Species**

Federally threatened and endangered wildlife species are protected under the ESA. Significant adverse effects on a federally listed wildlife species or its habitat require consultation with the Service under Section 7 or 10 of the ESA. Candidate species are species not yet listed as threatened or endangered but that may be listed in the future.

The Service indicates that five threatened or endangered wildlife species have potential for occurrence in Arapahoe County: Preble's meadow jumping mouse (*Zapus hudsonius preblei*), piping plover (*Charadrius melodus*), whooping crane (*Grus americana*), pallid sturgeon (*Scaphirhynchus albus*), and monarch butterfly (*Danaus plexippus*) (Service 2024). Surveys have been conducted in the past for Preble's meadow jumping mouse though no known captures have been recorded.

The black-footed ferret (*Mustela nigripes*) is an endangered species of North America due to its decline in the early 1900s from prairie dog eradication throughout the Great Plains (Service 2024).

Reintroduction efforts have been ongoing in Colorado with the help of CPW. ERO is aware of previous conversations between the county and CPW pertaining to the Property's suitability for black-footed ferret habitat and reintroduction. A site for reintroduction must provide sufficient acreage to support 30 breeding adult ferrets, and thus requires approximately 1,500 acres of occupied prairie dog habitat that consists of a grouping of prairie dog colonies in close proximity to each other (the entire acreage is not expected to be one large prairie dog colony). In its current state, ERO does not recommend reintroduction of black-footed ferrets onto the Property due to the lack of prairie dog presence but recommends monitoring prairie dog populations.

### **State Listed Species**

The northern leopard frog (*Lithobates pipiens*) is known to occur on the Property and has been found in previous surveys conducted by CNHP (CNHP 2017 and CPW 2023). The northern leopard frog occurs throughout Colorado from the plains to the mountains up to 12,000 feet. Northern leopard frogs are currently ranked by NatureServe as secure globally (G5) and vulnerable in Colorado (S3). Populations of the northern leopard frog are in decline and although the exact cause is unknown, Colorado specific declines are likely in part due to the presence of bullfrogs (*Lithobates catesbiana*). There were no sightings or captures of northern leopard frogs during the 2024 field visits, although the Woodhouse's toad (*Anaxyrus woodhousii*) was noted.

Black tailed prairie dogs (*Cynomys ludovicianus*) play an important role in the shortgrass prairie ecosystem. These small mammals help to increase plant and mammal diversity due to their foraging techniques and are also important prey for coyote, fox, hawks, and other predators. NatureServe ranks this species as secure to vulnerable across its range (G3G4), and in Colorado they are considered vulnerable (S3). Prairie dogs have experienced a monumental loss in habitat due to development and loss of suitable habitat. Prairie dog colonies on the Property are seemingly in decline based on comparisons with aerial imagery and previous CNHP surveys. The location of previous colonies on the western boundary have moved further inward onto the Property and have significantly shrunk in size. Previously known colonies on the northwest portion and east of Bijou Creek were not observed. It is not immediately clear why the prairie dog population has declined in recent years, though it could be the result of plague, adjacent neighbor disturbance, and lower foraging opportunities.

The short-horned lizard (*Phrynosoma hernandesi*) was observed on the Property during previous surveys conducted by CNHP. NatureServe ranks this species as secure across its range (G5), and in Colorado they are also considered secure (S5). Short-horned lizards are found throughout western North America and occur throughout Colorado in sparse shortgrass and shrubland. They are known to be in decline due to development and intense cultivation practices.

### **High Value Wildlife Grazing Areas**

The property provides good forage opportunities for local fauna. The dense herbaceous vegetative cover with an abundance of native species makes the property a highly desirable grazing area for mule deer,

white-tailed deer and pronghorn. Mule deer and pronghorn were both seen actively grazing on the property during the 2024 baseline survey.

## Recommendations

This section provides an overview of recommendations for the Property based on field observations.

### Vegetation

Vegetation communities are generally in good condition particularly in areas of intact shortgrass prairie with the presence of noxious weeds throughout. Although there are weed infestations, they are not currently a concern to the overall biological health of the property. Previously cultivated areas have transitioned to poor-quality nonnative grassland which could be areas to focus restoration. Future vegetation considerations should focus on weed management and avoidance of shortgrass prairie fragmentation. Recommendations for vegetation include:

- Avoid fragmentation of intact shortgrass prairie as much as possible in planning efforts.
- Identify site-specific strategies to improve soil fertility and increase native vegetation cover and diversity, including goals and success criteria, timelines for monitoring, and adaptive management thresholds in key shortgrass prairie areas.
- Follow CDOA noxious weed regulations to stop the continued spread of List B species, which are most prevalent in Units 1 and 4.
- In areas of temporary disturbance, consider weed control of List B species, topsoil testing, and revegetation measures with native species.
- Continue with existing weed management protocols and target disturbed and higher concentration areas. Consider developing a noxious weed management plan to monitor and address infestations annually.
- Concentrate immediate weed management activities along disturbed areas. Monitor for weed infestations during trail building and construction efforts as new disturbances can create ripe habitats for weeds.

### Riparian

The riparian floodplain is a high-value biological resource, though portions of it may be transitioning into a more upland community due to recent flooding and grazing impacts. Erosion and incision are the main concerns along the creek corridor with high cottonwood die off and low recruitment in some areas. Future riparian considerations should focus on increasing cottonwood and willow recruitment and maintaining the existing cottonwood population. Recommendations for hydrologic resources and the riparian area include:

- Site planning should minimize riparian impacts as much as possible.

- Explore potential riparian improvement options (such as planting cottonwood saplings and sandbar willow stakes) to enhance the creek corridor.
- Monitor creek channel and riparian habitat condition along Bijou Creek to ensure ample foraging opportunities are available.
- Consider standing dead tree removal if development occurs in the creek corridor for visitor safety.
- Monitor wetland reestablishment closer to the creek channel to ensure habitat quality is maintained.
- Reduce cattle access to wetland and riparian areas in wetter seasons such as spring and early summer to reduce disturbance to geomorphology when soils are highly saturated and vegetation when most species are in their growing period.
- Consider incorporating a grazing management plan to better understand when cattle should or should not be allowed in the riparian areas.

## Wildlife

Wildlife presence and use of the property is strong with mule deer, pronghorn, white tailed deer, small mammals, and birds as the main users. Prairie dog colonies have downsized dramatically and shifted without a clear understanding of why. Future wildlife considerations should focus on maintaining wildlife habitat connectivity and available forage. Recommendations for wildlife include:

- Overall habitat conservation is favored over site-specific conservation efforts to maintain the existing intact habitat.
- Future surveys should focus on specific sites where recreation and wildlife goals are in conflict.
- Future surveys should evaluate the recovery of riparian habitat for Preble's meadow jumping mouse and other wildlife species.
- Consider removing or replacing outdated fencing and installing wildlife-friendly fencing where appropriate. CPW recommends spacing smooth or barbed wire at a height of 42 inches or less, at least 12 inches between the top two wires, and at least 16 inches between the bottom wire or rail and the ground to allow for passage of pronghorn, deer, and small mammals with reduced damage to fencing (CPW 2021).
- Consider dog management strategies (such as off-leash policies) during planning efforts to minimize disturbances to sensitive wildlife habitat areas.
- Monitor raptor nests and minimize disturbances in these areas during critical periods such as reproduction and nesting.
- Monitor prairie dog colonies to understand changes in population.
- Continue conversations with CPW to discuss habitat suitability for black-footed ferret reintroduction.
- Consider dog management initiatives such as off-leash policies or dog restricted areas or seasons to protect sensitive wildlife species.

## References

- Colorado Department of Agriculture (CDOA). 2015. Noxious Weed Management Program. <http://www.colorado.gov/cs/Satellite/Agriculture-Main/CDAG/117408408733>.
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- Colorado Parks and Wildlife (CPW). 2021. Fencing With Wildlife in Mind. March. <https://cpw.state.co.us/Documents/LandWater/PrivateLandPrograms/FencingWithWildlifeInMind.pdf>
- Natural Resources Conservation Service (NRCS). 2023. Soil Survey of Arapahoe County. August.
- Rickel, B. 2005. Chapter 2: Large Native Ungulates, Assessment of Grassland Ecosystem Conditions in the Southwestern United States: Wildlife and Fish Volume 2 (D. M. Finch, Ed.). USDA Forest Service General Technical Report RMRS-GTR-135-vol. 2, 168 p.
- U.S. Fish and Wildlife Service (Service). 2024. Black-footed Ferret. <https://www.fws.gov/species/black-footed-ferret-mustela-nigripes>.

## **Figures**

**Figure 1. Vicinity Map**

**Figure 2. Soils**

**Figure 3. Vegetation Communities**

**Figure 4. Noxious Weeds**

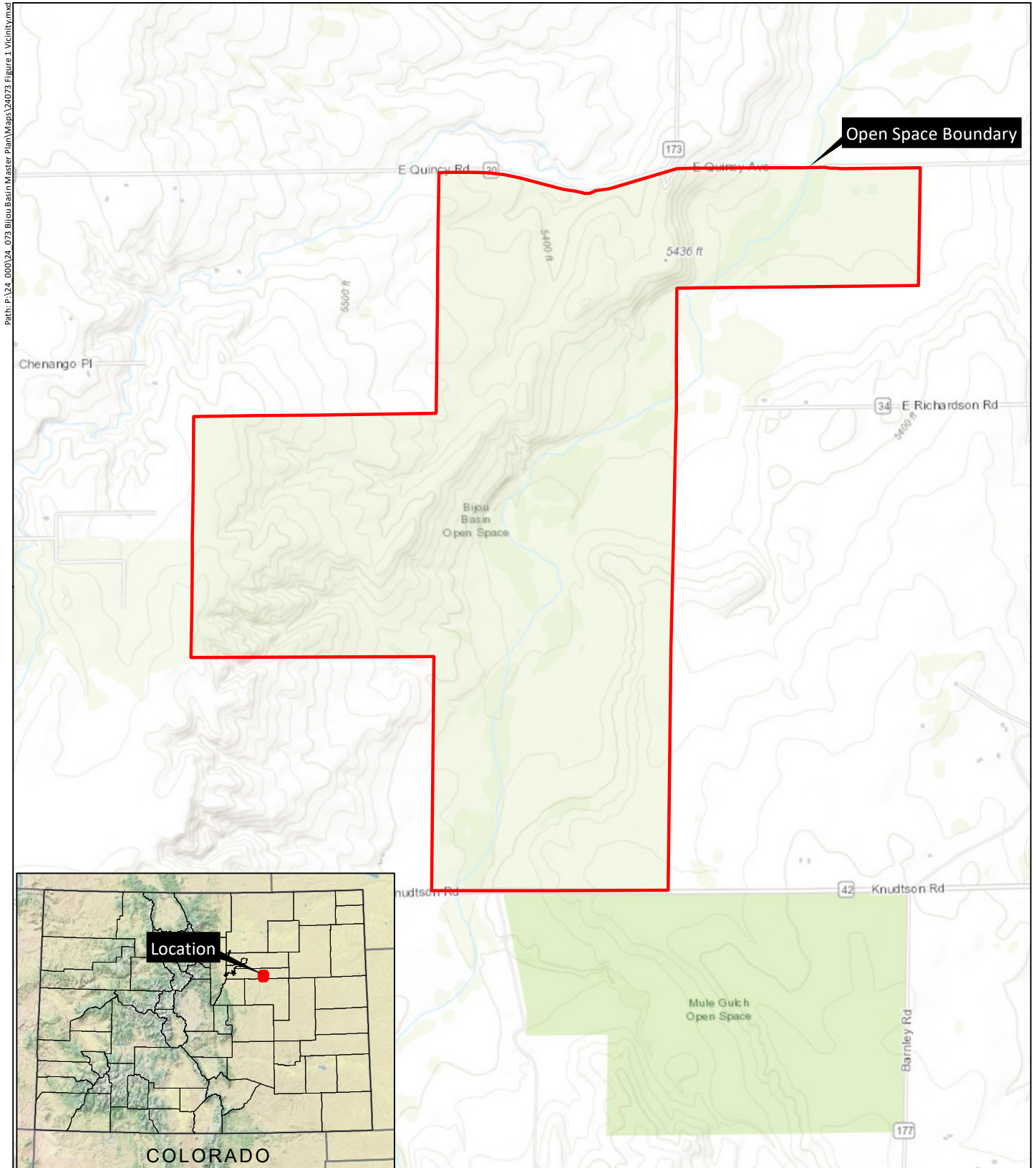
**Figure 5. Overall Cover**

**Figure 6. Native Cover**

**Figure 7. Noxious Weeds Cover**

**Figure 8. Riparian Assessment**

**Figure 9. Wildlife Habitat**



## Bijou Basin Open Space

Sections 7, 8, 18, and 19, T5S, R61W; Section 13, T5S, R62W; 6th PM

UTM NAD 83: Zone 13N; 563530mE, 4385579mN

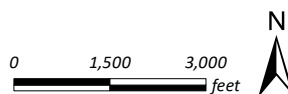
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USGS Strasburg, Strasburg SE, Byers, and Byers SW, CO Quadrangles

Arapahoe County, Colorado

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

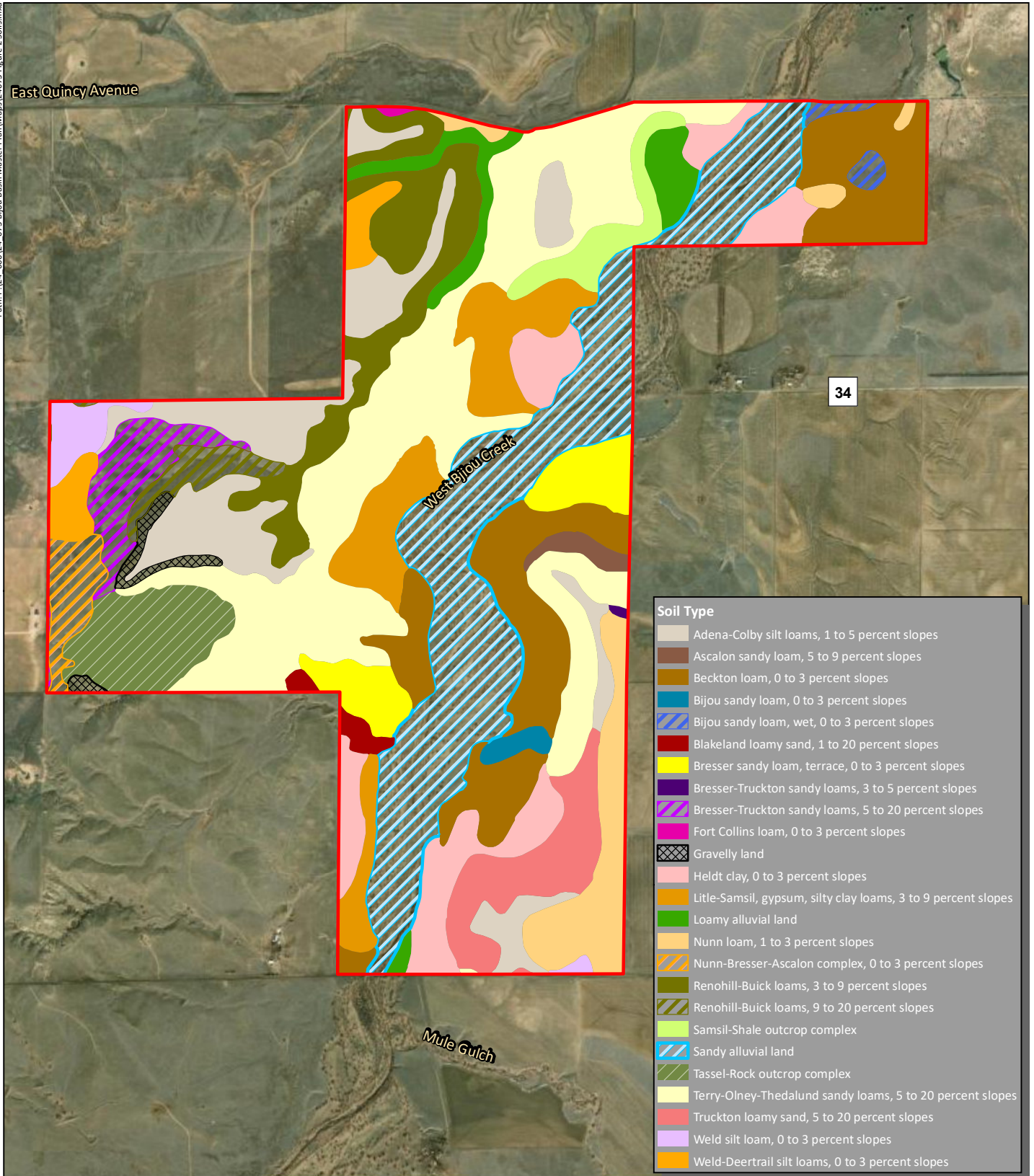
Copyright: © 2013 National Geographic Society, i-cubed



## Figure 1 Vicinity Map

Prepared for: Arapahoe County  
File: 24073 Figure 1 Vicinity.mxd [dlH]  
August 5, 2024

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ERO Resources Corp.



Bijou Basin Open Space

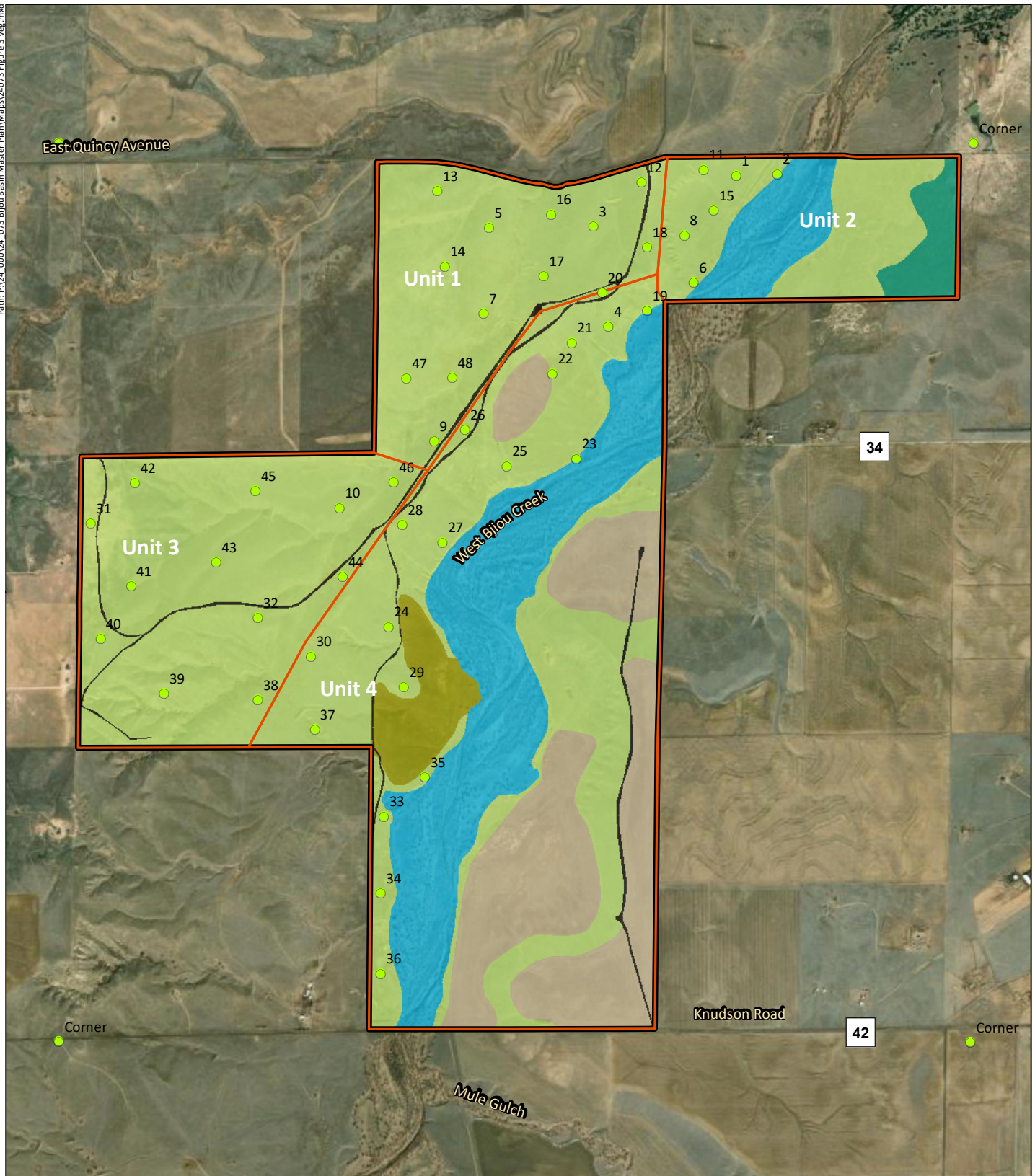
Property Boundary

Figure 2  
Soils



Prepared for: Arapahoe County  
File: 24073 Figure 2 Soils.mxd [dlH]  
August 5, 2024

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### Bijou Basin Open Space

-  Property Boundary
-  Vegetation Sample Point
-  Grazing Unit
-  Rocky Mountain Foothill Grassland
-  Western Great Plains Shortgrass Prairie

-  Western Great Plains Riparian/Floodplain
-  Herbaceous Planted/Cultivated
-  Nonnative Upland Grassland
-  Disturbed/Developed

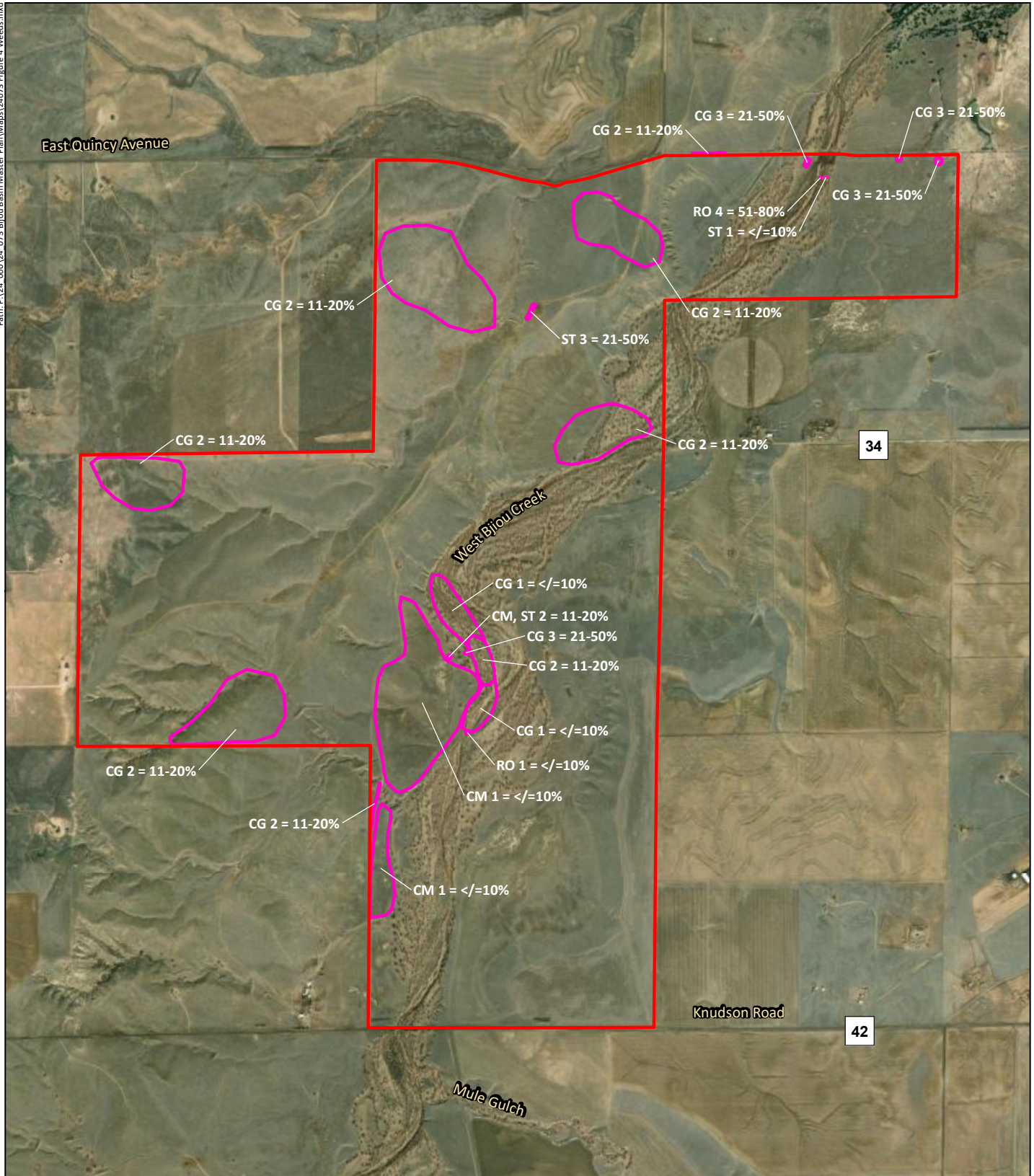
0 1,250 2,500  
feet



**Figure 3**  
**Vegetation Communities**

Prepared for: Arapahoe County  
File: 24073 Figure 3 Veg.mxd [dlh]  
September 11, 2024

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**Bijou Basin Open Space**

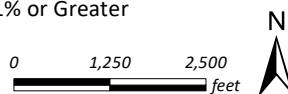
- Property Boundary
- Noxious Weeds

Noxious Weeds

CG = Cheatgrass  
CM = Common Mullein  
RO = Russian Olive  
ST = Scotch thistle

Noxious Weed Density

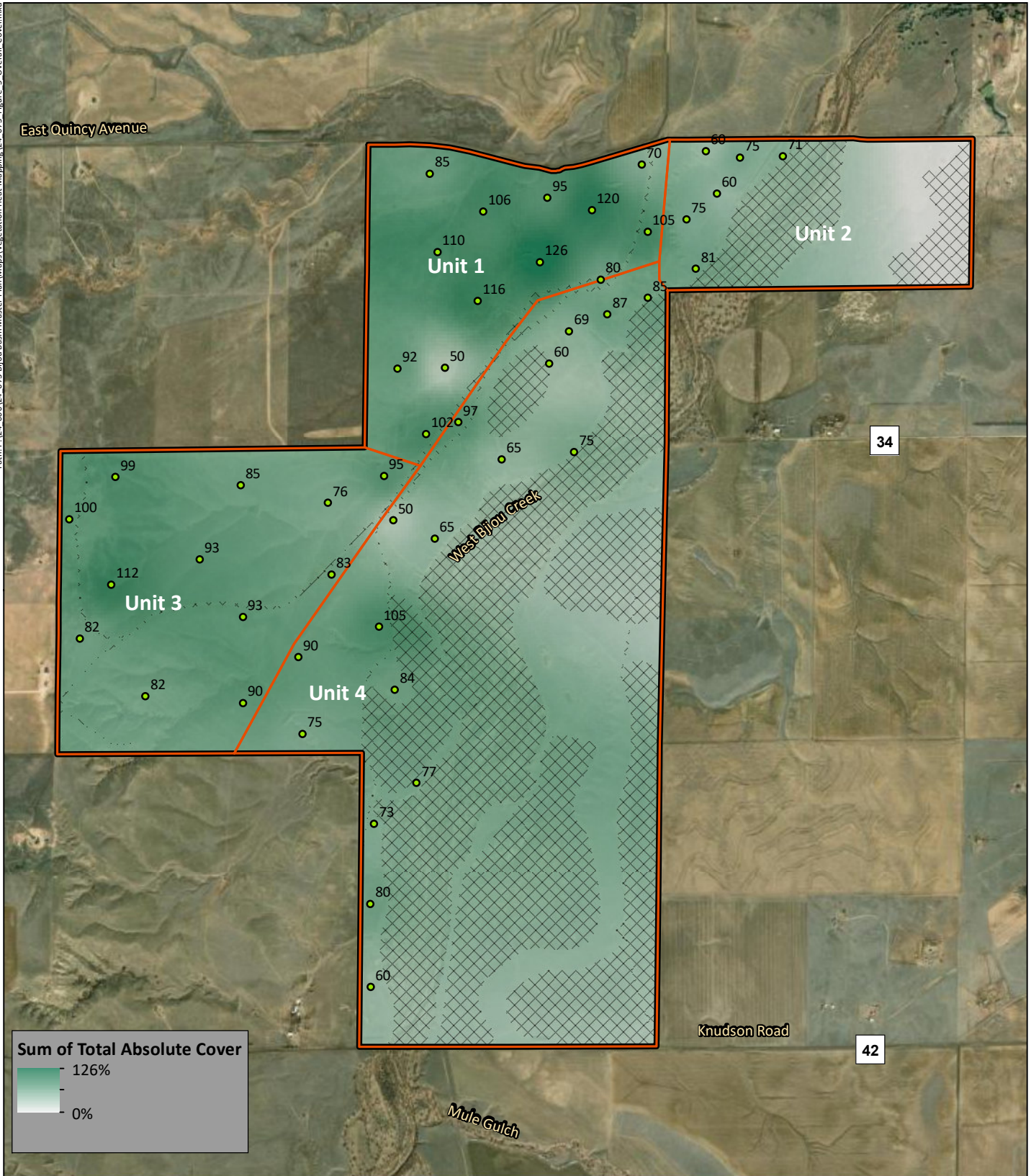
1 = 10% or Less  
2 = 11-20%  
3 = 21-50 %  
4 = 51-80%  
5 = 81% or Greater



**Figure 4**  
**Noxious Weeds**

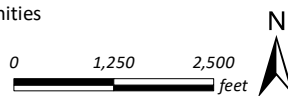
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August 7, 2024

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### Bijou Basin Open Space

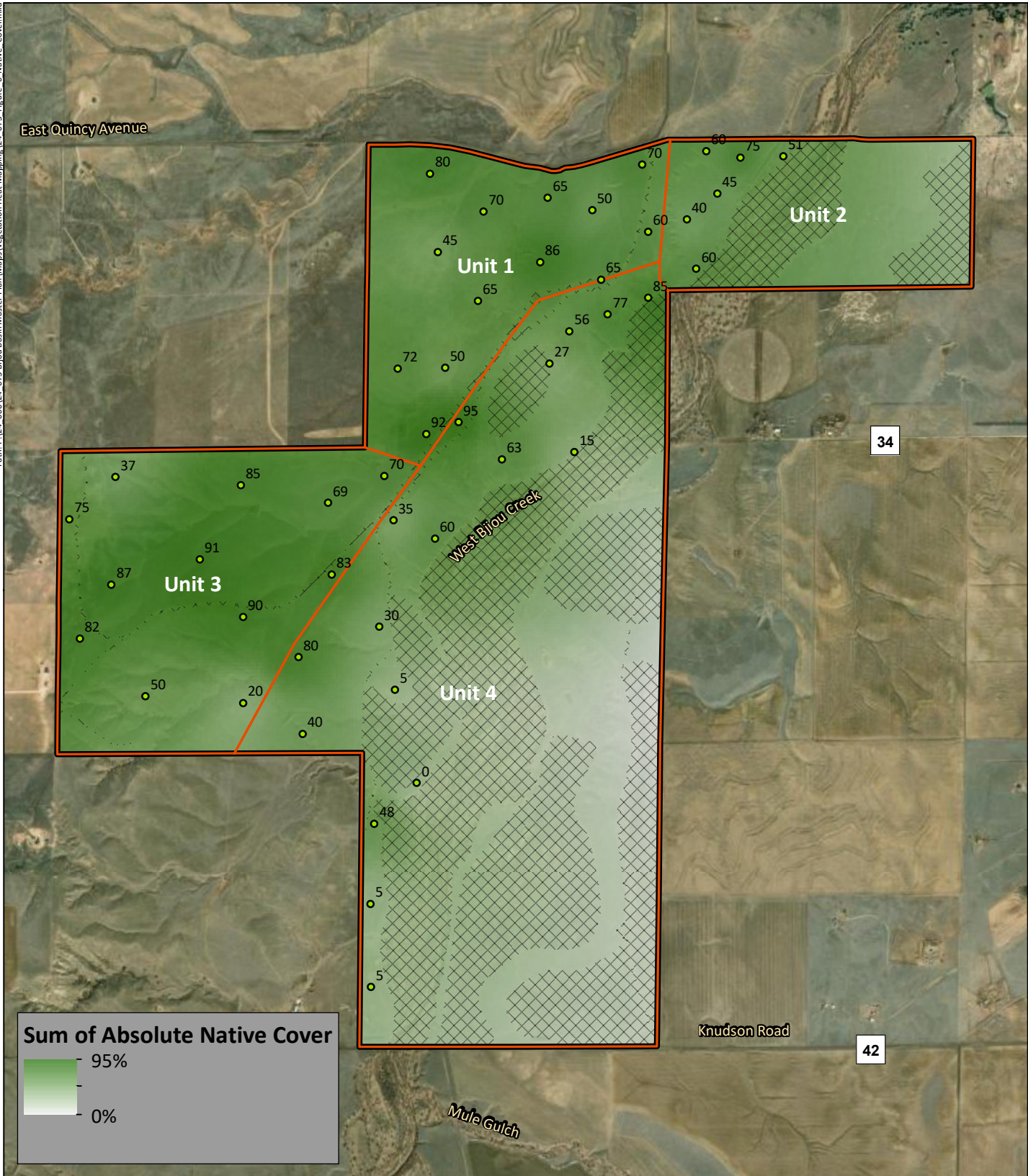
- Sample Point
- ▭ Grazing Unit
- ▭ Property Boundary
- ▨ Non-Western Great Plains Shortgrass Prairie Vegetation Communities



### Figure 5 Overall Cover

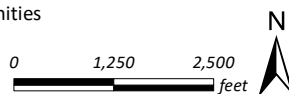
Prepared for: Arapahoe County  
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September 11, 2024

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ERO Resources Corp.



### Bijou Basin Open Space

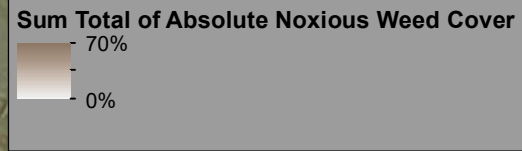
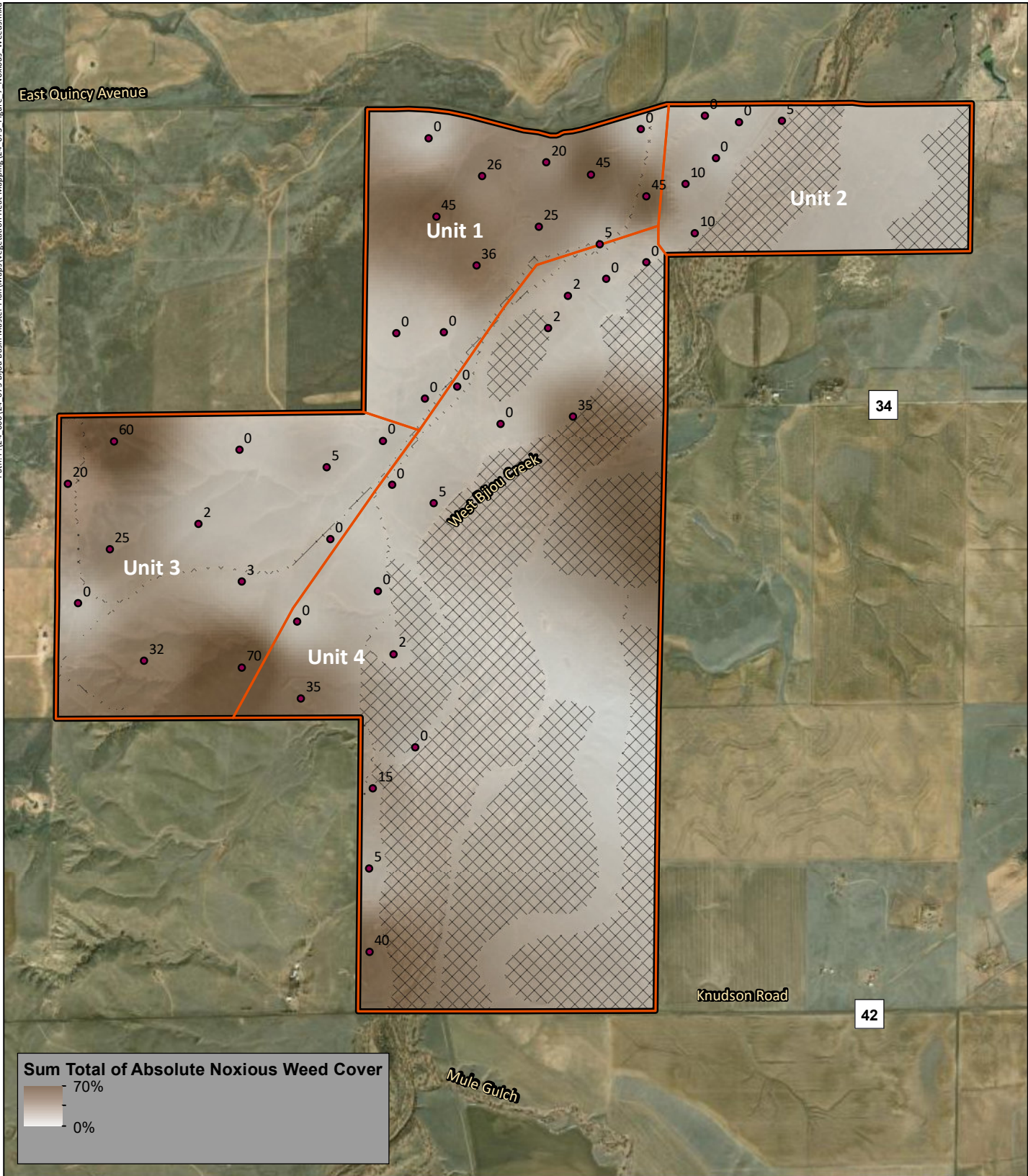
- Sample Point
- ▭ Grazing Unit
- ▭ Property Boundary
- ▨ Non-Western Great Plains Shortgrass Prairie Vegetation Communities



### Figure 6 Native Cover

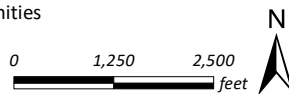
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September 11, 2024

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**Bijou Basin Open Space**

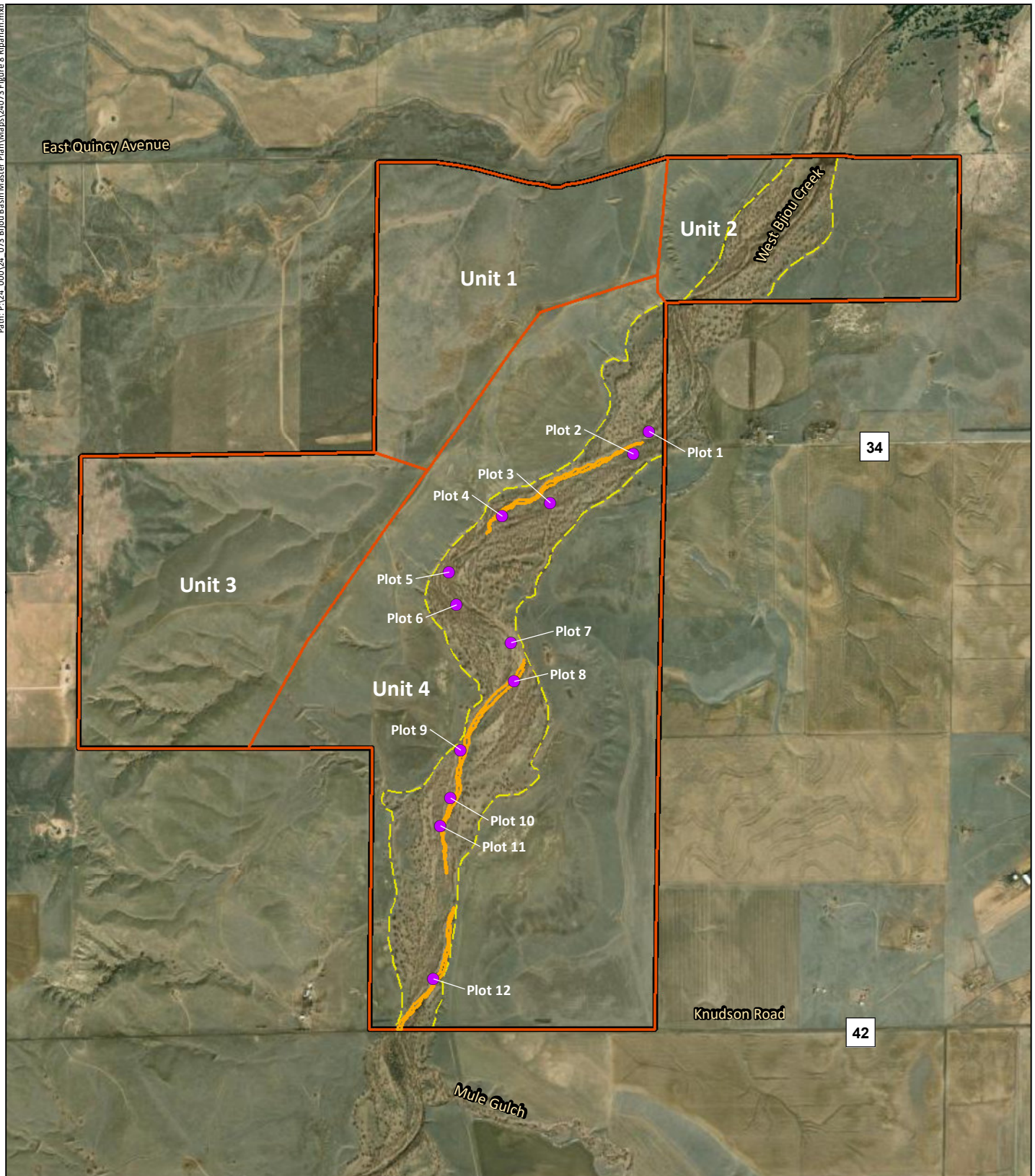
- Sample Point
- ▭ Grazing Unit
- ▭ Property Boundary
- ▨ Non-Western Great Plains Shortgrass Prairie Vegetation Communities



**Figure 7**  
**Noxious Weeds Cover**

Prepared for: Arapahoe County  
File: 24\_073\_Figure\_7\_Noxious\_Weeds.mxd [dlH]  
September 11, 2024

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### Bijou Basin Open Space

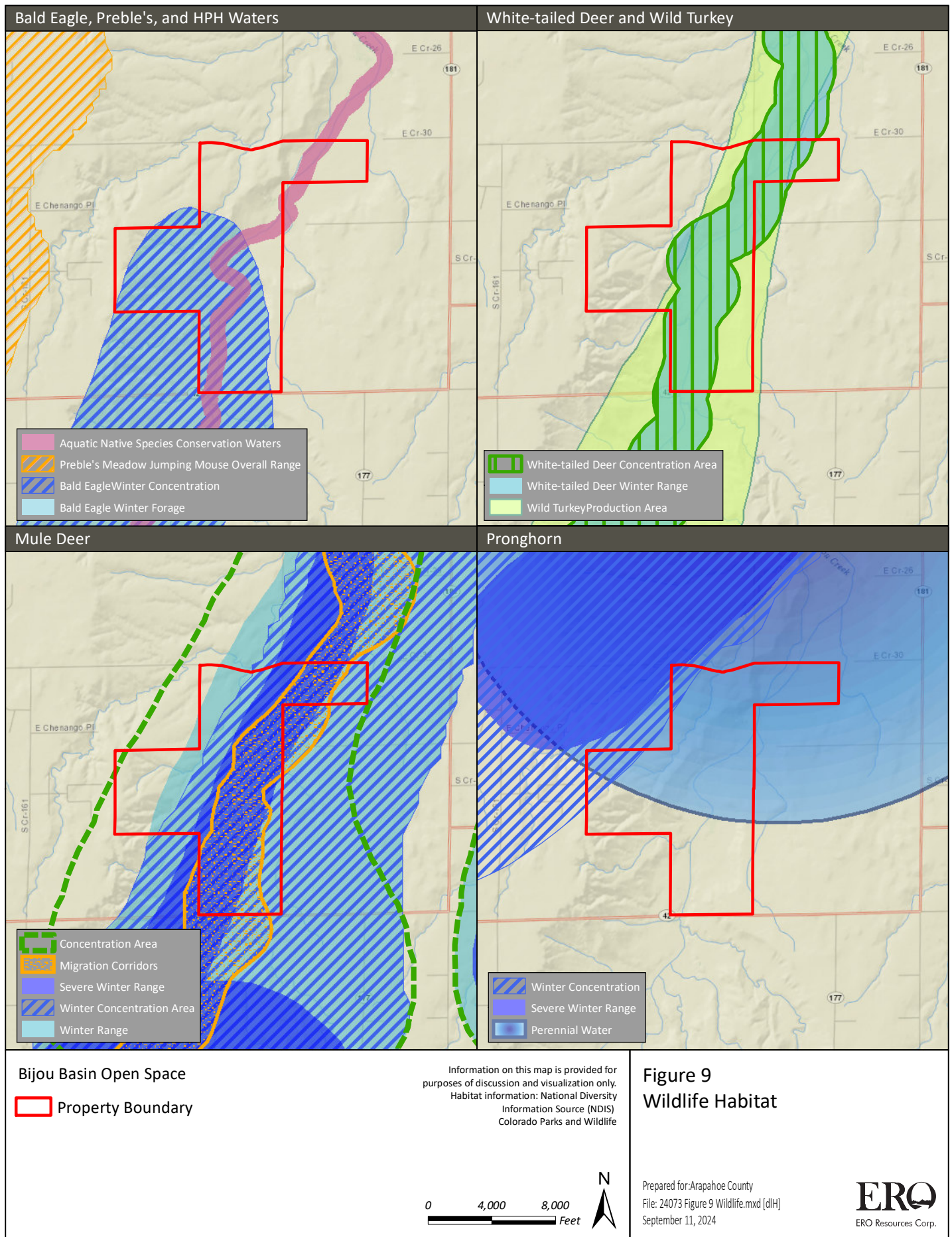
-  Property Boundary
-  Riparian Vegetation Plot
-  Intermittent Wetlands (11.32 ac)
-  Grazing Unit
-  Riparian Boundary



**Figure 8**  
**Riparian Assessment**

Prepared for: Arapahoe County  
File: 24073 Figure 8 Riparian.mxd [dlH]  
September 12, 2024

**ERO**  
ERO Resources Corp.



# Appendix A. Vegetation Species That May Occur on the Property.

| Common name                 | Scientific name               | Vegetation Community Presence                                                        | Dominant? |
|-----------------------------|-------------------------------|--------------------------------------------------------------------------------------|-----------|
| Indian ricegrass            | <i>Achnatherum hymenoides</i> | Western Great Plains Riparian/Floodplain                                             |           |
| Crested wheatgrass          | <i>Agropyron cristatum</i>    | Western Great Plains Shortgrass Prairie                                              |           |
| Small-leaf pussytoes        | <i>Antennaria parvifolia</i>  | Western Great Plains Shortgrass Prairie                                              |           |
| Indianhemp                  | <i>Apocynum cannabinum</i>    | Western Great Plains Riparian/Floodplain                                             |           |
| Crested pricklypoppey       | <i>Argemone polyanthemos</i>  | Western Great Plains Shortgrass Prairie                                              |           |
| Purple three-awn            | <i>Aristida purpurea</i>      | Western Great Plains Shortgrass Prairie                                              |           |
| Prairie sagebrush           | <i>Artemisia frigida</i>      | Western Great Plains Shortgrass Prairie                                              |           |
| White sagebrush             | <i>Artemisia ludoviciana</i>  | Western Great Plains Shortgrass Prairie                                              |           |
| Showy milkweed              | <i>Asclepias speciosa</i>     | Western Great Plains Riparian/Floodplain                                             |           |
| Kochia                      | <i>Bassia scoparia</i>        | Western Great Plains Shortgrass Prairie,<br>Western Great Plains Riparian/Floodplain |           |
| Buffalograss                | <i>Bouteloua dactyloides</i>  | Western Great Plains Shortgrass Prairie                                              |           |
| Blue grama                  | <i>Bouteloua gracilis</i>     | Western Great Plains Shortgrass Prairie                                              | X         |
| Field brome                 | <i>Bromus arvensis</i>        | Western Great Plains Shortgrass Prairie                                              |           |
| Smooth brome                | <i>Bromus inermis</i>         | Western Great Plains Shortgrass Prairie                                              |           |
| Cheatgrass                  | <i>Bromus tectorum</i>        | Western Great Plains Shortgrass Prairie                                              |           |
| Musk thistle                | <i>Carduus nutans</i>         | Western Great Plains Shortgrass Prairie                                              |           |
| Threadleaf sedge            | <i>Carex filifolia</i>        | Western Great Plains Riparian/Floodplain                                             |           |
| Nebraska sedge              | <i>Carex nebrascensis</i>     | Western Great Plains Riparian/Floodplain                                             |           |
| Wholeleaf Indian Paintbrush | <i>Castilleja integra</i>     | Western Great Plains Shortgrass Prairie                                              |           |
| Spotted knapweed            | <i>Centaurea stoebe</i>       | Nonnative upland grassland, Western<br>Great Plains Shortgrass Prairie               |           |
| Indian paintbrush           | <i>Castilleja mutis</i>       | Western Great Plains Shortgrass Prairie                                              |           |
| Water hemlock               | <i>Cicuta maculata</i>        | Western Great Plains Riparian/Floodplain                                             |           |
| Canada thistle              | <i>Cirsium arvense</i>        | Western Great Plains Riparian/Floodplain                                             |           |
| Wavyleaf thistle            | <i>Cirsium undulatum</i>      | Western Great Plains Shortgrass Prairie                                              |           |
| Canadian horseweed          | <i>Conyza canadensis</i>      | Western Great Plains Shortgrass Prairie                                              | X         |

Natural Resources Assessment  
 Bijou Basin Open Space  
 Arapahoe County, Colorado

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| Common name           | Scientific name                  | Vegetation Community Presence                                                               | Dominant? |
|-----------------------|----------------------------------|---------------------------------------------------------------------------------------------|-----------|
| Threadleaf            | <i>Coreopsis verticillata</i>    | Western Great Plains Shortgrass Prairie                                                     |           |
| Houndstongue          | <i>Cynoglossum officinale</i>    | Western Great Plains Riparian/Floodplain                                                    |           |
| Flixweed              | <i>Descurainia sophia</i>        | Western Great Plains Shortgrass Prairie                                                     |           |
| Nylon hedgehog cactus | <i>Echinocereus viridiflorus</i> | Western Great Plains Shortgrass Prairie                                                     |           |
| Russian olive         | <i>Elaeagnus angustifolia</i>    | Western Great Plains Riparian/Floodplain                                                    |           |
| Common spikerush      | <i>Eleocharis palustris</i>      | Western Great Plains Riparian/Floodplain                                                    |           |
| Canada wildrye        | <i>Elymus canadensis</i>         | Western Great Plains Riparian/Floodplain                                                    |           |
| Squirreltail          | <i>Elymus elymoides</i>          | Western Great Plains Shortgrass Prairie                                                     |           |
| Slender wheatgrass    | <i>Elymus trachycaulus</i>       | Western Great Plains Shortgrass Prairien<br>and Western Great Plains<br>Riparian/Floodplain |           |
| Smooth horsetail      | <i>Equisetum laevigatum</i>      | Western Great Plains Riparian/Floodplain                                                    |           |
| Candygrass            | <i>Eragrostis cilianensis</i>    | Western Great Plains Riparian/Floodplain                                                    |           |
| Annual Wheatgrass     | <i>Eremopyrum triticeum</i>      | Western Great Plains Shortgrass Prairie                                                     |           |
| Rubber rabbitbrush    | <i>Ericameria nauseosa</i>       | Western Great Plains Shortgrass Prairie                                                     |           |
| Trailing fleabane     | <i>Erigeron flagellaris</i>      | Western Great Plains Shortgrass Prairie                                                     |           |
| Spinystar             | <i>Escobaria vivipara</i>        | Western Great Plains Shortgrass Prairie                                                     |           |
| American licorice     | <i>Glycyrrhiza lepidota</i>      | Western Great Plains Riparian/Floodplain                                                    |           |
| Broom snakeweed       | <i>Gutierrezia sarothrae</i>     | Western Great Plains Shortgrass Prairie                                                     |           |
| Utah sweetvetch       | <i>Hedysarum boreale</i>         | Western Great Plains Shortgrass Prairie                                                     |           |
| Common sunflower      | <i>Helianthus annuus</i>         | Western Great Plains Shortgrass Prairie                                                     |           |
| Needle and thread     | <i>Hesperostipa comata</i>       | Western Great Plains Shortgrass Prairie                                                     |           |
| Hairy goldenaster     | <i>Heterotheca villosa</i>       | Western Great Plains Shortgrass Prairie                                                     |           |
| Foxtail barley        | <i>Hordeum jubatum</i>           | Western Great Plains Shortgrass Prairie                                                     |           |
| Little barley         | <i>Hordeum pusillum</i>          | Western Great Plains Shortgrass<br>Prairie/Herbaceous Planted/cultivated                    |           |
| Barley                | <i>Hordeum vulgare</i>           | Western Great Plains Shortgrass<br>Prairie/Herbaceous Planted/cultivated                    |           |
| Baltic rush           | <i>Juncus baltica</i>            | Western Great Plains Riparian/Floodplain                                                    |           |
| Dudley's rush         | <i>Juncus dudleyi</i>            | Western Great Plains Riparian/Floodplain                                                    |           |

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| Common name              | Scientific name                             | Vegetation Community Presence                                                        | Dominant? |
|--------------------------|---------------------------------------------|--------------------------------------------------------------------------------------|-----------|
| Winterfat                | <i>Krascheninnikovia lanata</i>             | Western Great Plains Shortgrass Prairie                                              |           |
| Alfalfa                  | <i>Medicago sativa</i>                      | Western Great Plains Shortgrass Prairie/Herbaceous Planted/cultivated                |           |
| Sweetclover              | <i>Melilotus officinalis</i>                | Western Great Plains Shortgrass Prairie                                              | X         |
| Prairie bluebells        | <i>Mertensia lanceolata</i>                 | Western Great Plains Shortgrass Prairie                                              |           |
| Green needle grass       | <i>Nassella viridula</i>                    | Western Great Plains Shortgrass Prairie                                              |           |
| Tufted eve primrose      | <i>Oenothera caespitosa</i>                 | Western Great Plains Riparian/Floodplain                                             |           |
| Scotch thistle           | <i>Onopordum acanthium</i>                  | Western Great Plains Shortgrass Prairie                                              |           |
| Twistspine pricklypear   | <i>Opuntia macrorhiza</i>                   | Western Great Plains Shortgrass Prairie                                              |           |
| Plains pricklypear       | <i>Opuntia polyacantha</i>                  | Western Great Plains Shortgrass Prairie                                              |           |
| Purple locoweed          | <i>Oxytropis lambertii</i>                  | Western Great Plains Shortgrass Prairie                                              |           |
| White locoweed           | <i>Oxytropis sericea</i>                    | Western Great Plains Shortgrass Prairie                                              |           |
| Western wheatgrass       | <i>Pascopyrum smithii</i>                   | Western Great Plains Shortgrass Prairie                                              |           |
| Broadbeard beardtongue   | <i>Pentstemon angustifolia</i>              | Western Great Plains Shortgrass Prairie                                              |           |
| Kentucky bluegrass       | <i>Poa pratensis</i>                        | Western Great Plains Riparian/Floodplain                                             |           |
| Plains cottonwood        | <i>Populus deltoides</i>                    | Western Great Plains Shortgrass Prairie and Western Great Plains Riparian/Floodplain | X         |
| Prairie coneflower       | <i>Ratibida columnifera</i>                 | Western Great Plains Shortgrass Prairie                                              |           |
| Skunkbush sumac          | <i>Rhus trilobata</i> var. <i>trilobata</i> | Western Great Plains Shortgrass Prairie                                              |           |
| Golden currant           | <i>Ribes aureum</i>                         | Western Great Plains Shortgrass Prairie                                              |           |
| Wax currant              | <i>Ribes cereum</i>                         | Western Great Plains Shortgrass Prairie                                              |           |
| Sandbar willow           | <i>Salix exigua</i>                         | Western Great Plains Riparian/Floodplain                                             |           |
| Prickly Russian thistle  | <i>Salsola tragus</i>                       | Western Great Plains Shortgrass Prairie                                              |           |
| Common threesquare       | <i>Schoenoplectus pungens</i>               | Western Great Plains Riparian/Floodplain                                             |           |
| Small tumbleweed mustard | <i>Sisymbrium loeselii</i>                  | Western Great Plains Shortgrass Prairie                                              |           |
| Buffalobur nightshade    | <i>Solanum ristratum</i>                    | Western Great Plains Shortgrass Prairie                                              |           |
| Indiangrass              | <i>Sorghastrum nutans</i>                   | Western Great Plains Shortgrass Prairie                                              |           |
| Scarlet globemallow      | <i>Sphaeralcea coccinea</i>                 | Western Great Plains Riparian/Floodplain                                             |           |
| Sand dropseed            | <i>Sporobolus cryptandrus</i>               | Western Great Plains Shortgrass Prairie                                              | X         |

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| Common name       | Scientific name                    | Vegetation Community Presence                                                        | Dominant? |
|-------------------|------------------------------------|--------------------------------------------------------------------------------------|-----------|
| Wirelettuce       | <i>Stephanomeria sp.</i>           | Western Great Plains Shortgrass Prairie                                              |           |
| Salsify           | <i>Tragopogon porrifolius</i>      | Western Great Plains Shortgrass Prairie/Herbaceous planted/cultivated                |           |
| Common mullein    | <i>Verbascum thapsus</i>           | Western Great Plains Shortgrass Prairie/<br>Western Great Plains Riparian/Floodplain |           |
| Big-bract verbena | <i>Verbena bracteata</i>           | Western Great Plains Shortgrass Prairie                                              |           |
| Water speedwell   | <i>Veronica anagallis-aquatica</i> | Western Great Plains Riparian/Floodplain                                             |           |
| Soapweed yucca    | <i>Yucca glauca</i>                | Western Great Plains Shortgrass Prairie                                              | X         |

**Appendix B. Wildlife Species That May Occur On the Property.**

| Common Name          | Scientific Name                 |
|----------------------|---------------------------------|
| <b>Amphibians</b>    |                                 |
| Woodhouses's toad    | <i>Anaxyrus woodhousii</i>      |
| <b>Birds</b>         |                                 |
| American crow        | <i>Corvus brachyrhynchos</i>    |
| American kestrel     | <i>Falco sparverius</i>         |
| American robin       | <i>Turdus migratorius</i>       |
| Bald eagle           | <i>Haliaeetus leucocephalus</i> |
| Black-billed magpie  | <i>Pica hudsonia</i>            |
| Blue jay             | <i>Cyanocitta cristata</i>      |
| Brewer's sparrow     | <i>Spizella breweri</i>         |
| Brown headed cowbird | <i>Molothrus ater</i>           |
| Bullocks oriole      | <i>Icterus bullockii</i>        |
| Canada goose         | <i>Branta canadensis</i>        |
| Cassin's sparrow     | <i>Peucaea cassinii</i>         |
| Eastern kingbird     | <i>Tyrannus tyrannus</i>        |
| European starling    | <i>Sturnus vulgaris</i>         |
| Ferruginous hawk     | <i>Buteo regalis</i>            |
| Golden eagle         | <i>Aquila chrysaetos</i>        |
| Grasshopper sparrow  | <i>Ammodramus savannarum</i>    |
| House finch          | <i>Haemorhous mexicanus</i>     |
| House sparrow        | <i>Passer domesticus</i>        |
| House wren           | <i>Troglodytes aedon</i>        |
| Killdeer             | <i>Charadrius vociferus</i>     |
| Lark bunting         | <i>Calamospiza melanocorys</i>  |
| Long-billed curlew   | <i>Numenius americanus</i>      |
| Mountain plover      | <i>Charadrius montanus</i>      |

| Common Name               | Scientific Name               |
|---------------------------|-------------------------------|
| Mourning dove             | <i>Zenaida macroura</i>       |
| Northern harrier          | <i>Circus hudsonius</i>       |
| Northern mockingbird      | <i>Mimus polyglottos</i>      |
| Prairie falcon            | <i>Falco mexicanus</i>        |
| Red-tailed hawk           | <i>Buteo jamaicensis</i>      |
| Red-winged blackbird      | <i>Agelaius phoeniceus</i>    |
| Swainson's hawk           | <i>Buteo swainsoni</i>        |
| Turkey vulture            | <i>Cathartes aura</i>         |
| Western burrowing owl     | <i>Athene cunicularia</i>     |
| Western kingbird          | <i>Tyrannus verticalis</i>    |
| Western meadowlark        | <i>Sturnella neglecta</i>     |
| Western tanager           | <i>Piranga ludoviciana</i>    |
| Wild turkey               | <i>Meleagris gallopavo</i>    |
| Yellow warbler            | <i>Setophaga petechia</i>     |
| <b>Insects</b>            |                               |
| Monarch butterfly         | <i>Danaus plexippus</i>       |
| Yellow bumblebee          | <i>Bombus fervidus</i>        |
| <b>Mammals</b>            |                               |
| Big brown bat             | <i>Eptesicus fuscus</i>       |
| Coyote                    | <i>Canis latrans</i>          |
| Deer mouse                | <i>Peromyscus maniculatus</i> |
| Fringed myotis            | <i>Myotis thysanodes</i>      |
| Hoary bat                 | <i>Lasiurus cinereus</i>      |
| House mouse               | <i>Mus musculus</i>           |
| Little brown myotis       | <i>Myotis lucifugus</i>       |
| Mule deer                 | <i>Odocoileus hemionus</i>    |
| Olive-backed pocket mouse | <i>Perognathus fasciatus</i>  |
| Porcupine                 | <i>Erethizon dorsatum</i>     |

| Common Name                      | Scientific Name                  |
|----------------------------------|----------------------------------|
| Pronghorn                        | <i>Antilocapra americana</i>     |
| Raccoon                          | <i>Procyon lotor</i>             |
| Red bat                          | <i>Lasiurus borealis</i>         |
| Red fox                          | <i>Vulpes vulpes</i>             |
| Sagebrush vole                   | <i>Lemmyscus curtatus</i>        |
| Silver-haired bat                | <i>Lasionycteris noctivagans</i> |
| Striped skunk                    | <i>Mephitis mephitis</i>         |
| Tri-colored bat                  | <i>Pipistrellus subflavus</i>    |
| White-tailed jackrabbit          | <i>Lepus townsendii</i>          |
| <b>Reptiles</b>                  |                                  |
| Bullsnake                        | <i>Pituophis catenifer sayi</i>  |
| Common collared lizard           | <i>Crotaphytus collaris</i>      |
| Fence lizard                     | <i>Sceloporus undulatus</i>      |
| Hernandez's short-horned lizard  | <i>Phrynosoma hernandesi</i>     |
| Lined snake                      | <i>Tropidoclonion lineatum</i>   |
| Many-lined skink                 | <i>Plestiodon multivirgatus</i>  |
| Milksnake                        | <i>Lampropeltis triangulum</i>   |
| North American racer             | <i>Coluber constrictor</i>       |
| Ornate box turtle                | <i>Terrapene ornata ornata</i>   |
| Painted turtle                   | <i>Chrysemys picta</i>           |
| Plains gartersnake               | <i>Thamnophis radix</i>          |
| Plains hog-nosed snake           | <i>Heterodon nasicus</i>         |
| Prairie lizard                   | <i>Sceloporus consobrinus</i>    |
| Prairie rattlesnake              | <i>Crotalus viridis</i>          |
| Six-lined racerunner             | <i>Aspidoscelis sexlineatus</i>  |
| Western rattlesnake              | <i>Crotalus oreganus</i>         |
| Western terrestrial garter snake | <i>Thamnophis elegans</i>        |

# Appendix C. Shortgrass Prairie Point Survey Data and Species Lists

## All Data

|                                                     |
|-----------------------------------------------------|
| <b>Site Name: Bijou Basin (ERO project #24-073)</b> |
| <b>Date: 7/11/2024</b>                              |

| Surveyor(s) | Grazing Unit # | Sample Point # | Species Common Name     | Scientific Name               | Absolute cover (%) | Total cover | Relative cover (%) | Native Status (Native or Introduced) | Noxious Weed List |
|-------------|----------------|----------------|-------------------------|-------------------------------|--------------------|-------------|--------------------|--------------------------------------|-------------------|
| EMO, SAS    | 2              | 1              | Scarlet globemallow     | <i>Sphaeralcea coccinea</i>   | 5                  | 75          | 7                  | Native                               | N/A               |
| EMO, SAS    | 2              | 1              | Squirreltail            | <i>Elymus elymoides</i>       | 20                 | 75          | 27                 | Native                               | N/A               |
| EMO, SAS    | 2              | 1              | Western wheatgrass      | <i>Pascopyrum smithii</i>     | 50                 | 75          | 67                 | Native                               | N/A               |
| EMO, SAS    | 2              | 2              | Annual sunflower        | <i>Helianthus annuus</i>      | 1                  | 71          | 1                  | Native                               | N/A               |
| EMO, SAS    | 2              | 2              | Blue grama              | <i>Bouteloua gracilis</i>     | 30                 | 71          | 42                 | Native                               | N/A               |
| EMO, SAS    | 2              | 2              | Canadian horseweed      | <i>Conyza canadensis</i>      | 5                  | 71          | 7                  | Native                               | N/A               |
| EMO, SAS    | 2              | 2              | Cheatgrass              | <i>Bromus tectorum</i>        | 5                  | 71          | 7                  | Noxious                              | List C            |
| EMO, SAS    | 2              | 2              | Prairie coneflower      | <i>Ratibida columnifera</i>   | 15                 | 71          | 21                 | Native                               | N/A               |
| EMO, SAS    | 2              | 2              | Wirelettuce             | <i>Stephanomeria sp.</i>      | 10                 | 71          | 14                 | Native                               | N/A               |
| EMO, SAS    | 2              | 2              | White sagebrush         | <i>Artemisia ludoviciana</i>  | 5                  | 71          | 7                  | Noxious                              | N/A               |
| EMO, SAS    | 1              | 3              | Cheatgrass              | <i>Bromus tectorum</i>        | 5                  | 120         | 4                  | Noxious                              | List C            |
| EMO, SAS    | 1              | 3              | Green needlegrass       | <i>Nassella viridula</i>      | 45                 | 120         | 38                 | Native                               | N/A               |
| EMO, SAS    | 1              | 3              | Indian ricegrass        | <i>Achnatherum hymenoides</i> | 5                  | 120         | 4                  | Native                               | N/A               |
| EMO, SAS    | 1              | 3              | Kochia                  | <i>Bassia scoparia</i>        | 25                 | 120         | 21                 | Introduced                           | N/A               |
| EMO, SAS    | 1              | 3              | Spotted knapweed        | <i>Centaurea stoebe</i>       | 40                 | 120         | 33                 | Noxious                              | List B            |
| HBR, BS     | 4              | 4              | Annual sunflower        | <i>Helianthus annuus</i>      | 2                  | 87          | 2                  | Native                               | N/A               |
| HBR, BS     | 4              | 4              | Blue grama              | <i>Bouteloua gracilis</i>     | 5                  | 87          | 6                  | Native                               | N/A               |
| HBR, BS     | 4              | 4              | Indian ricegrass        | <i>Achnatherum hymenoides</i> | 5                  | 87          | 6                  | Native                               | N/A               |
| HBR, BS     | 4              | 4              | Prickly Russian thistle | <i>Salsola tragus</i>         | 5                  | 87          | 6                  | Introduced                           | N/A               |
| HBR, BS     | 4              | 4              | Soapweed yucca          | <i>Yucca glauca</i>           | 40                 | 87          | 46                 | Native                               | N/A               |
| HBR, BS     | 4              | 4              | Trailing fleabane       | <i>Erigeron flagellaris</i>   | 25                 | 87          | 29                 | Native                               | N/A               |
| HBR, BS     | 4              | 4              | Yellow sweetclover      | <i>Melilotus officinalis</i>  | 5                  | 87          | 6                  | Introduced                           | N/A               |
| EMO, SAS    | 1              | 5              | Blue grama              | <i>Bouteloua gracilis</i>     | 45                 | 106         | 42                 | Native                               | N/A               |
| EMO, SAS    | 1              | 5              | Cheatgrass              | <i>Bromus tectorum</i>        | 1                  | 106         | 1                  | Noxious                              | List C            |
| EMO, SAS    | 1              | 5              | Green needlegrass       | <i>Nassella viridula</i>      | 15                 | 106         | 14                 | Native                               | N/A               |
| EMO, SAS    | 1              | 5              | Kochia                  | <i>Bassia scoparia</i>        | 5                  | 106         | 5                  | Introduced                           | N/A               |
| EMO, SAS    | 1              | 5              | Prairie sagewort        | <i>Artemisia frigida</i>      | 10                 | 106         | 9                  | Native                               | N/A               |
| EMO, SAS    | 1              | 5              | Spotted knapweed        | <i>Centaurea stoebe</i>       | 25                 | 106         | 24                 | Noxious                              | List B            |
| EMO, SAS    | 1              | 5              | Yellow sweetclover      | <i>Melilotus officinalis</i>  | 5                  | 106         | 5                  | Introduced                           | N/A               |
| EMO, SAS    | 2              | 6              | Blue grama              | <i>Bouteloua gracilis</i>     | 15                 | 81          | 19                 | Native                               | N/A               |
| EMO, SAS    | 2              | 6              | Canadian horseweed      | <i>Conyza canadensis</i>      | 20                 | 81          | 25                 | Native                               | N/A               |
| EMO, SAS    | 2              | 6              | Cheatgrass              | <i>Bromus tectorum</i>        | 10                 | 81          | 12                 | Noxious                              | List C            |
| EMO, SAS    | 2              | 6              | Wirelettuce             | <i>Stephanomeria sp.</i>      | 10                 | 81          | 12                 | Native                               | N/A               |
| EMO, SAS    | 2              | 6              | Smooth brome            | <i>Bromus inermis</i>         | 1                  | 81          | 1                  | Introduced                           | N/A               |
| EMO, SAS    | 2              | 6              | Western wheatgrass      | <i>Pascopyrum smithii</i>     | 25                 | 81          | 31                 | Native                               | N/A               |
| EMO, SAS    | 1              | 7              | Blue grama              | <i>Bouteloua gracilis</i>     | 65                 | 116         | 56                 | Native                               | N/A               |
| EMO, SAS    | 1              | 7              | Cheatgrass              | <i>Bromus tectorum</i>        | 1                  | 116         | 1                  | Noxious                              | List C            |
| EMO, SAS    | 1              | 7              | Kochia                  | <i>Bassia scoparia</i>        | 15                 | 116         | 13                 | Introduced                           | N/A               |
| EMO, SAS    | 1              | 7              | Spotted knapweed        | <i>Centaurea stoebe</i>       | 35                 | 116         | 30                 | Noxious                              | List B            |
| EMO, SAS    | 2              | 8              | Blue grama              | <i>Bouteloua gracilis</i>     | 35                 | 75          | 47                 | Native                               | N/A               |
| EMO, SAS    | 2              | 8              | Cheatgrass              | <i>Bromus tectorum</i>        | 10                 | 75          | 13                 | Noxious                              | List C            |
| EMO, SAS    | 2              | 8              | Prairie sagewort        | <i>Artemisia frigida</i>      | 5                  | 75          | 7                  | Native                               | N/A               |
| EMO, SAS    | 2              | 8              | Yellow sweetclover      | <i>Melilotus officinalis</i>  | 25                 | 75          | 33                 | Introduced                           | N/A               |
| JJD, VM     | 1              | 9              | Blue grama              | <i>Bouteloua gracilis</i>     | 60                 | 102         | 59                 | Native                               | N/A               |
| JJD, VM     | 1              | 9              | Canadian horseweed      | <i>Conyza canadensis</i>      | 15                 | 102         | 15                 | Native                               | N/A               |
| JJD, VM     | 1              | 9              | Field brome             | <i>Bromus arvensis</i>        | 5                  | 102         | 5                  | Introduced                           | N/A               |
| JJD, VM     | 1              | 9              | Kochia                  | <i>Bassia scoparia</i>        | 5                  | 102         | 5                  | Introduced                           | N/A               |
| JJD, VM     | 1              | 9              | Plains pricklypear      | <i>Opuntia polyacantha</i>    | 2                  | 102         | 2                  | Native                               | N/A               |
| JJD, VM     | 1              | 9              | Prairie sagewort        | <i>Artemisia frigida</i>      | 15                 | 102         | 15                 | Native                               | N/A               |
| JJD, VM     | 3              | 10             | Blue grama              | <i>Bouteloua gracilis</i>     | 30                 | 76          | 39                 | Native                               | N/A               |
| JJD, VM     | 3              | 10             | Canadian horseweed      | <i>Conyza canadensis</i>      | 20                 | 76          | 26                 | Native                               | N/A               |
| JJD, VM     | 3              | 10             | Cheatgrass              | <i>Bromus tectorum</i>        | 5                  | 76          | 7                  | Noxious                              | List C            |
| JJD, VM     | 3              | 10             | Common barley           | <i>Hordeum vulgare</i>        | 2                  | 76          | 3                  | Native                               | N/A               |
| JJD, VM     | 3              | 10             | Plains pricklypear      | <i>Opuntia polyacantha</i>    | 2                  | 76          | 3                  | Native                               | N/A               |
| JJD, VM     | 3              | 10             | Prickly Russian thistle | <i>Salsola tragus</i>         | 2                  | 76          | 3                  | Introduced                           | N/A               |
| JJD, VM     | 3              | 10             | Scarlet globemallow     | <i>Sphaeralcea coccinea</i>   | 5                  | 76          | 7                  | Native                               | N/A               |
| JJD, VM     | 3              | 10             | Trailing fleabane       | <i>Erigeron flagellaris</i>   | 10                 | 76          | 13                 | Native                               | N/A               |
| EMO, SAS    | 2              | 11             | Blue grama              | <i>Bouteloua gracilis</i>     | 30                 | 60          | 50                 | Native                               | N/A               |
| EMO, SAS    | 2              | 11             | Prairie sagewort        | <i>Artemisia frigida</i>      | 5                  | 60          | 8                  | Native                               | N/A               |
| EMO, SAS    | 2              | 11             | Scarlet globemallow     | <i>Sphaeralcea coccinea</i>   | 20                 | 60          | 33                 | Native                               | N/A               |

|          |   |    |                         |                                  |    |     |     |            |        |
|----------|---|----|-------------------------|----------------------------------|----|-----|-----|------------|--------|
| EMO, SAS | 2 | 11 | Western wheatgrass      | <i>Pascopyrum smithii</i>        | 5  | 60  | 8   | Native     | N/A    |
| EMO, SAS | 1 | 12 | Blue grama              | <i>Bouteloua gracilis</i>        | 35 | 70  | 50  | Native     | N/A    |
| EMO, SAS | 1 | 12 | Canadian horsetweed     | <i>Conyza canadensis</i>         | 10 | 70  | 14  | Native     | N/A    |
| EMO, SAS | 1 | 12 | Prairie sagewort        | <i>Artemisia frigida</i>         | 20 | 70  | 29  | Native     | N/A    |
| EMO, SAS | 1 | 12 | Small leaf pussytoes    | <i>Antennaria parvifolia</i>     | 5  | 70  | 7   | Native     | N/A    |
| EMO, SAS | 1 | 13 | Blue grama              | <i>Bouteloua gracilis</i>        | 75 | 85  | 88  | Native     | N/A    |
| EMO, SAS | 1 | 13 | Prairie sagewort        | <i>Artemisia frigida</i>         | 5  | 85  | 6   | Native     | N/A    |
| EMO, SAS | 1 | 13 | Prickly Russian thistle | <i>Salsola tragus</i>            | 5  | 85  | 6   | Introduced | N/A    |
| EMO, SAS | 1 | 14 | Blue grama              | <i>Bouteloua gracilis</i>        | 45 | 110 | 41  | Native     | N/A    |
| EMO, SAS | 1 | 14 | Kochia                  | <i>Bassia scoparia</i>           | 20 | 110 | 18  | Introduced | N/A    |
| EMO, SAS | 1 | 14 | Spotted knapweed        | <i>Centaurea stoebe</i>          | 45 | 110 | 41  | Noxious    | List B |
| EMO, SAS | 2 | 15 | Broom snakeweed         | <i>Gutierrezia sarothrae</i>     | 40 | 60  | 67  | Native     | N/A    |
| EMO, SAS | 2 | 15 | Prickly Russian thistle | <i>Salsola tragus</i>            | 15 | 60  | 25  | Introduced | N/A    |
| EMO, SAS | 2 | 15 | Western wheatgrass      | <i>Pascopyrum smithii</i>        | 5  | 60  | 8   | Native     | N/A    |
| EMO, SAS | 1 | 16 | Blue grama              | <i>Bouteloua gracilis</i>        | 45 | 95  | 47  | Native     | N/A    |
| EMO, SAS | 1 | 16 | Cheatgrass              | <i>Bromus tectorum</i>           | 5  | 95  | 5   | Noxious    | List C |
| EMO, SAS | 1 | 16 | Indiangrass             | <i>Sorghastrum nutans</i>        | 10 | 95  | 11  | Native     | N/A    |
| EMO, SAS | 1 | 16 | Kochia                  | <i>Bassia scoparia</i>           | 10 | 95  | 11  | Introduced | N/A    |
| EMO, SAS | 1 | 16 | Nylon hedgehog cactus   | <i>Echinocereus viridiflorus</i> | 5  | 95  | 5   | Native     | N/A    |
| EMO, SAS | 1 | 16 | Prairie sagewort        | <i>Artemisia frigida</i>         | 5  | 95  | 5   | Native     | N/A    |
| EMO, SAS | 1 | 16 | Spotted knapweed        | <i>Centaurea stoebe</i>          | 15 | 95  | 16  | Noxious    | List B |
| EMO, SAS | 1 | 17 | Big-bract verbena       | <i>Verbena bracteata</i>         | 1  | 126 | 1   | Native     | N/A    |
| EMO, SAS | 1 | 17 | Blue grama              | <i>Bouteloua gracilis</i>        | 45 | 126 | 36  | Native     | N/A    |
| EMO, SAS | 1 | 17 | Foxtail barley          | <i>Hordeum jubatum</i>           | 5  | 126 | 4   | Native     | N/A    |
| EMO, SAS | 1 | 17 | Green needlegrass       | <i>Nassella viridula</i>         | 5  | 126 | 4   | Native     | N/A    |
| EMO, SAS | 1 | 17 | Kochia                  | <i>Bassia scoparia</i>           | 15 | 126 | 12  | Introduced | N/A    |
| EMO, SAS | 1 | 17 | Plains pricklypear      | <i>Opuntia polyacantha</i>       | 25 | 126 | 20  | Native     | N/A    |
| EMO, SAS | 1 | 17 | Scarlet globemallow     | <i>Sphaeralcea coccinea</i>      | 5  | 126 | 4   | Native     | N/A    |
| EMO, SAS | 1 | 17 | Spotted knapweed        | <i>Centaurea stoebe</i>          | 25 | 126 | 20  | Noxious    | List B |
| EMO, SAS | 1 | 18 | Blue grama              | <i>Bouteloua gracilis</i>        | 30 | 105 | 29  | Native     | N/A    |
| EMO, SAS | 1 | 18 | Cheatgrass              | <i>Bromus tectorum</i>           | 10 | 105 | 10  | Noxious    | List C |
| EMO, SAS | 1 | 18 | Plains pricklypear      | <i>Opuntia polyacantha</i>       | 20 | 105 | 19  | Native     | N/A    |
| EMO, SAS | 1 | 18 | Scarlet globemallow     | <i>Sphaeralcea coccinea</i>      | 10 | 105 | 10  | Native     | N/A    |
| EMO, SAS | 1 | 18 | Spotted knapweed        | <i>Centaurea stoebe</i>          | 35 | 105 | 33  | Noxious    | List B |
| EMO, SAS | 4 | 19 | Western wheatgrass      | <i>Pascopyrum smithii</i>        | 85 | 85  | 100 | Native     | N/A    |
| EMO, SAS | 4 | 20 | Alfalfa                 | <i>Medicago sativa</i>           | 10 | 80  | 13  | Introduced | N/A    |
| EMO, SAS | 4 | 20 | Big-bract verbena       | <i>Verbena bracteata</i>         | 5  | 80  | 6   | Native     | N/A    |
| EMO, SAS | 4 | 20 | Cheatgrass              | <i>Bromus tectorum</i>           | 5  | 80  | 6   | Noxious    | List C |
| EMO, SAS | 4 | 20 | Green needlegrass       | <i>Nassella viridula</i>         | 30 | 80  | 38  | Native     | N/A    |
| EMO, SAS | 4 | 20 | Western wheatgrass      | <i>Pascopyrum smithii</i>        | 30 | 80  | 38  | Native     | N/A    |
| HBR, BS  | 4 | 21 | Canadian horsetweed     | <i>Conyza canadensis</i>         | 2  | 69  | 3   | Native     | N/A    |
| HBR, BS  | 4 | 21 | Common mullein          | <i>Verbascum thapsus</i>         | 2  | 69  | 3   | Noxious    | List C |
| HBR, BS  | 4 | 21 | Field brome             | <i>Bromus arvensis</i>           | 6  | 69  | 9   | Introduced | N/A    |
| HBR, BS  | 4 | 21 | Indian ricegrass        | <i>Achnatherum hymenoides</i>    | 54 | 69  | 78  | Native     | N/A    |
| HBR, BS  | 4 | 21 | Prickly Russian thistle | <i>Salsola tragus</i>            | 5  | 69  | 7   | Introduced | N/A    |
| HBR, BS  | 4 | 22 | Canadian horsetweed     | <i>Conyza canadensis</i>         | 2  | 60  | 3   | Native     | N/A    |
| HBR, BS  | 4 | 22 | Common mullein          | <i>Verbascum thapsus</i>         | 2  | 60  | 3   | Noxious    | List C |
| HBR, BS  | 4 | 22 | Prickly lettuce         | <i>Lactuca serriola</i>          | 3  | 60  | 5   | Introduced | N/A    |
| HBR, BS  | 4 | 22 | Prickly Russian thistle | <i>Salsola tragus</i>            | 10 | 60  | 17  | Introduced | N/A    |
| HBR, BS  | 4 | 22 | Salsify                 | <i>Tragopogon porrifolius</i>    | 8  | 60  | 13  | Introduced | N/A    |
| HBR, BS  | 4 | 22 | Sand dropseed           | <i>Sporobolus cryptandrus</i>    | 10 | 60  | 17  | Native     | N/A    |
| HBR, BS  | 4 | 22 | Trailing fleabane       | <i>Erigeron flagellaris</i>      | 5  | 60  | 8   | Native     | N/A    |
| HBR, BS  | 4 | 22 | Western wheatgrass      | <i>Pascopyrum smithii</i>        | 10 | 60  | 17  | Native     | N/A    |
| HBR, BS  | 4 | 22 | Yellow sweetclover      | <i>Melilotus officinalis</i>     | 10 | 60  | 17  | Introduced | N/A    |
| HBR, BS  | 4 | 23 | Blue grama              | <i>Bouteloua gracilis</i>        | 13 | 75  | 17  | Native     | N/A    |
| HBR, BS  | 4 | 23 | Candygrass              | <i>Eragrostis cilianensis</i>    | 5  | 75  | 7   | Introduced | N/A    |
| HBR, BS  | 4 | 23 | Cheatgrass              | <i>Bromus tectorum</i>           | 30 | 75  | 40  | Noxious    | List C |
| HBR, BS  | 4 | 23 | Common mullein          | <i>Verbascum thapsus</i>         | 5  | 75  | 7   | Noxious    | List C |
| HBR, BS  | 4 | 23 | Trailing fleabane       | <i>Erigeron flagellaris</i>      | 2  | 75  | 3   | Native     | N/A    |
| HBR, BS  | 4 | 23 | Yellow sweetclover      | <i>Melilotus officinalis</i>     | 20 | 75  | 27  | Introduced | N/A    |
| JJD, VM  | 4 | 24 | Field brome             | <i>Bromus arvensis</i>           | 60 | 105 | 57  | Introduced | N/A    |
| JJD, VM  | 4 | 24 | Indian ricegrass        | <i>Achnatherum hymenoides</i>    | 15 | 105 | 14  | Native     | N/A    |
| JJD, VM  | 4 | 24 | Prickly Russian thistle | <i>Salsola tragus</i>            | 15 | 105 | 14  | Introduced | N/A    |
| JJD, VM  | 4 | 24 | Trailing fleabane       | <i>Erigeron flagellaris</i>      | 15 | 105 | 14  | Native     | N/A    |
| HBR, BS  | 4 | 25 | Blue grama              | <i>Bouteloua gracilis</i>        | 10 | 65  | 15  | Native     | N/A    |
| HBR, BS  | 4 | 25 | Field brome             | <i>Bromus arvensis</i>           | 2  | 65  | 3   | Introduced | N/A    |
| HBR, BS  | 4 | 25 | Indian ricegrass        | <i>Achnatherum hymenoides</i>    | 8  | 65  | 12  | Native     | N/A    |

|         |   |    |                         |                               |    |     |    |            |        |
|---------|---|----|-------------------------|-------------------------------|----|-----|----|------------|--------|
| HBR, BS | 4 | 25 | Plains pricklypear      | <i>Opuntia polyacantha</i>    | 30 | 65  | 46 | Native     | N/A    |
| HBR, BS | 4 | 25 | Trailing fleabane       | <i>Erigeron flagellaris</i>   | 15 | 65  | 23 | Native     | N/A    |
| JJD, VM | 4 | 26 | Alfalfa                 | <i>Medicago sativa</i>        | 2  | 97  | 2  | Introduced | N/A    |
| JJD, VM | 4 | 26 | Blue grama              | <i>Bouteloua gracilis</i>     | 50 | 97  | 52 | Native     | N/A    |
| JJD, VM | 4 | 26 | Canadian horseweed      | <i>Conyza canadensis</i>      | 30 | 97  | 31 | Native     | N/A    |
| JJD, VM | 4 | 26 | Indian ricegrass        | <i>Achnatherum hymenoides</i> | 3  | 97  | 3  | Native     | N/A    |
| JJD, VM | 4 | 26 | Prairie sagewort        | <i>Artemisia frigida</i>      | 10 | 97  | 10 | Native     | N/A    |
| JJD, VM | 4 | 26 | Scarlet globemallow     | <i>Sphaeralcea coccinea</i>   | 1  | 97  | 1  | Native     | N/A    |
| JJD, VM | 4 | 26 | Spinystar               | <i>Escobaria vivipara</i>     | 1  | 97  | 1  | Native     | N/A    |
| HBR, BS | 4 | 27 | Annual sunflower        | <i>Helianthus annuus</i>      | 5  | 65  | 8  | Native     | N/A    |
| HBR, BS | 4 | 27 | Blue grama              | <i>Bouteloua gracilis</i>     | 10 | 65  | 15 | Native     | N/A    |
| HBR, BS | 4 | 27 | Buffalograss            | <i>Bouteloua dactyloides</i>  | 5  | 65  | 8  | Native     | N/A    |
| HBR, BS | 4 | 27 | Diffuse knapweed        | <i>Centaurea diffusa</i>      | 5  | 65  | 8  | Noxious    | List B |
| HBR, BS | 4 | 27 | Plains pricklypear      | <i>Opuntia polyacantha</i>    | 15 | 65  | 23 | Native     | N/A    |
| HBR, BS | 4 | 27 | Prairie sagewort        | <i>Artemisia frigida</i>      | 10 | 65  | 15 | Native     | N/A    |
| HBR, BS | 4 | 27 | Soapweed yucca          | <i>Yucca glauca</i>           | 5  | 65  | 8  | Native     | N/A    |
| HBR, BS | 4 | 27 | Trailing fleabane       | <i>Erigeron flagellaris</i>   | 10 | 65  | 15 | Native     | N/A    |
| HBR, BS | 4 | 28 | Blue grama              | <i>Bouteloua gracilis</i>     | 10 | 50  | 20 | Native     | N/A    |
| HBR, BS | 4 | 28 | Hairy goldenaster       | <i>Heterotheca villosa</i>    | 2  | 50  | 4  | Native     | N/A    |
| HBR, BS | 4 | 28 | Prairie sagewort        | <i>Artemisia frigida</i>      | 8  | 50  | 16 | Native     | N/A    |
| HBR, BS | 4 | 28 | Purple locoweed         | <i>Oxytropis lambertii</i>    | 5  | 50  | 10 | Native     | N/A    |
| HBR, BS | 4 | 28 | Soapweed yucca          | <i>Yucca glauca</i>           | 10 | 50  | 20 | Native     | N/A    |
| HBR, BS | 4 | 28 | Threadleaf              | <i>Coreopsis verticillata</i> | 12 | 50  | 24 | Introduced | N/A    |
| HBR, BS | 4 | 28 | Unknown #1              | N/A                           | 3  | 50  | 6  | N/A        | N/A    |
| HBR, BS | 4 | 29 | Common mullein          | <i>Verbascum thapsus</i>      | 2  | 84  | 2  | Noxious    | List C |
| HBR, BS | 4 | 29 | Field brome             | <i>Bromus arvensis</i>        | 10 | 84  | 12 | Introduced | N/A    |
| HBR, BS | 4 | 29 | Prickly Russian thistle | <i>Salsola tragus</i>         | 50 | 84  | 60 | Introduced | N/A    |
| HBR, BS | 4 | 29 | Salsify                 | <i>Tragopogon porrifolius</i> | 2  | 84  | 2  | Introduced | N/A    |
| HBR, BS | 4 | 29 | Trailing fleabane       | <i>Erigeron flagellaris</i>   | 5  | 84  | 6  | Native     | N/A    |
| HBR, BS | 4 | 29 | Yellow sweetclover      | <i>Melilotus officinalis</i>  | 15 | 84  | 18 | Introduced | N/A    |
| JJD, VM | 4 | 30 | Blue grama              | <i>Bouteloua gracilis</i>     | 30 | 90  | 33 | Native     | N/A    |
| JJD, VM | 4 | 30 | Green needlegrass       | <i>Nassella viridula</i>      | 25 | 90  | 28 | Native     | N/A    |
| JJD, VM | 4 | 30 | Soapweed yucca          | <i>Yucca glauca</i>           | 20 | 90  | 22 | Native     | N/A    |
| JJD, VM | 4 | 30 | White Locoweed          | <i>Oxytropis sericea</i>      | 5  | 90  | 6  | Native     | N/A    |
| JJD, VM | 4 | 30 | Yellow sweetclover      | <i>Melilotus officinalis</i>  | 10 | 90  | 11 | Introduced | N/A    |
| JJD, VM | 3 | 31 | Cheatgrass              | <i>Bromus tectorum</i>        | 20 | 100 | 20 | Noxious    | List C |
| JJD, VM | 3 | 31 | Prairie sagewort        | <i>Artemisia frigida</i>      | 5  | 100 | 5  | Native     | N/A    |
| JJD, VM | 3 | 31 | Prickly Russian thistle | <i>Salsola tragus</i>         | 5  | 100 | 5  | Introduced | N/A    |
| JJD, VM | 3 | 31 | Sand dropseed           | <i>Sporobolus cryptandrus</i> | 50 | 100 | 50 | Native     | N/A    |
| JJD, VM | 3 | 31 | Slender wheatgrass      | <i>Elymus trachycaulus</i>    | 10 | 100 | 10 | Native     | N/A    |
| JJD, VM | 3 | 31 | Trailing fleabane       | <i>Erigeron flagellaris</i>   | 10 | 100 | 10 | Native     | N/A    |
| JJD, VM | 3 | 32 | Blue grama              | <i>Bouteloua gracilis</i>     | 70 | 93  | 75 | Native     | N/A    |
| JJD, VM | 3 | 32 | Broom snakeweed         | <i>Gutierrezia sarothrae</i>  | 2  | 93  | 2  | Native     | N/A    |
| JJD, VM | 3 | 32 | Common mullein          | <i>Verbascum thapsus</i>      | 3  | 93  | 3  | Noxious    | List C |
| JJD, VM | 3 | 32 | Plains pricklypear      | <i>Opuntia polyacantha</i>    | 1  | 93  | 1  | Native     | N/A    |
| JJD, VM | 3 | 32 | Sand dropseed           | <i>Sporobolus cryptandrus</i> | 10 | 93  | 11 | Native     | N/A    |
| JJD, VM | 3 | 32 | Scarlet globemallow     | <i>Sphaeralcea coccinea</i>   | 3  | 93  | 3  | Native     | N/A    |
| JJD, VM | 3 | 32 | Spinystar               | <i>Escobaria vivipara</i>     | 1  | 93  | 1  | Native     | N/A    |
| JJD, VM | 3 | 32 | Trailing fleabane       | <i>Erigeron flagellaris</i>   | 3  | 93  | 3  | Native     | N/A    |
| HBR, BS | 4 | 33 | Blue grama              | <i>Bouteloua gracilis</i>     | 8  | 73  | 11 | Native     | N/A    |
| HBR, BS | 4 | 33 | Cheatgrass              | <i>Bromus tectorum</i>        | 15 | 73  | 21 | Noxious    | List C |
| HBR, BS | 4 | 33 | Field brome             | <i>Bromus arvensis</i>        | 5  | 73  | 7  | Introduced | N/A    |
| HBR, BS | 4 | 33 | Field pennycress        | <i>Thlaspi arvense</i>        | 3  | 73  | 4  | Introduced | N/A    |
| HBR, BS | 4 | 33 | Plains pricklypear      | <i>Opuntia polyacantha</i>    | 15 | 73  | 21 | Native     | N/A    |
| HBR, BS | 4 | 33 | Prickly Russian thistle | <i>Salsola tragus</i>         | 2  | 73  | 3  | Introduced | N/A    |
| HBR, BS | 4 | 33 | Trailing fleabane       | <i>Erigeron flagellaris</i>   | 25 | 73  | 34 | Native     | N/A    |
| HBR, BS | 4 | 34 | Cheatgrass              | <i>Bromus tectorum</i>        | 5  | 80  | 6  | Noxious    | List C |
| HBR, BS | 4 | 34 | Field brome             | <i>Bromus arvensis</i>        | 20 | 80  | 25 | Introduced | N/A    |
| HBR, BS | 4 | 34 | Hairy goldenaster       | <i>Heterotheca villosa</i>    | 5  | 80  | 6  | Native     | N/A    |
| HBR, BS | 4 | 34 | Prickly Russian thistle | <i>Salsola tragus</i>         | 5  | 80  | 6  | Introduced | N/A    |
| HBR, BS | 4 | 34 | Yellow sweetclover      | <i>Melilotus officinalis</i>  | 45 | 80  | 56 | Introduced | N/A    |
| HBR, BS | 4 | 35 | Prickly Russian thistle | <i>Salsola tragus</i>         | 2  | 77  | 3  | Introduced | N/A    |
| HBR, BS | 4 | 35 | Smooth brome            | <i>Bromus inermis</i>         | 70 | 77  | 91 | Introduced | N/A    |
| HBR, BS | 4 | 35 | Yellow sweetclover      | <i>Melilotus officinalis</i>  | 5  | 77  | 6  | Introduced | N/A    |
| HBR, BS | 4 | 36 | Cheatgrass              | <i>Bromus tectorum</i>        | 25 | 60  | 42 | Noxious    | List C |
| HBR, BS | 4 | 36 | Diffuse knapweed        | <i>Centaurea diffusa</i>      | 15 | 60  | 25 | Noxious    | List B |
| HBR, BS | 4 | 36 | Prickly poppy           | <i>Argemone polyanthemus</i>  | 5  | 60  | 8  | Native     | N/A    |

|         |   |    |                         |                               |    |     |    |            |        |
|---------|---|----|-------------------------|-------------------------------|----|-----|----|------------|--------|
| HBR, BS | 4 | 36 | Prickly Russian thistle | <i>Salsola tragus</i>         | 15 | 60  | 25 | Introduced | N/A    |
| JJD, VM | 4 | 37 | Cheatgrass              | <i>Bromus tectorum</i>        | 35 | 75  | 47 | Noxious    | List C |
| JJD, VM | 4 | 37 | Plains pricklypear      | <i>Opuntia polyacantha</i>    | 15 | 75  | 20 | Native     | N/A    |
| JJD, VM | 4 | 37 | Sand dropseed           | <i>Sporobolus cryptandrus</i> | 15 | 75  | 20 | Native     | N/A    |
| JJD, VM | 4 | 37 | Trailing fleabane       | <i>Erigeron flagellaris</i>   | 10 | 75  | 13 | Native     | N/A    |
| JJD, VM | 3 | 38 | Canadian horseweed      | <i>Conyza canadensis</i>      | 5  | 90  | 6  | Native     | N/A    |
| JJD, VM | 3 | 38 | Cheatgrass              | <i>Bromus tectorum</i>        | 70 | 90  | 78 | Noxious    | List C |
| JJD, VM | 3 | 38 | Indian ricegrass        | <i>Achnatherum hymenoides</i> | 5  | 90  | 6  | Native     | N/A    |
| JJD, VM | 3 | 38 | Prairie sagewort        | <i>Artemesia frigida</i>      | 10 | 90  | 11 | Native     | N/A    |
| JJD, VM | 3 | 39 | Blue grama              | <i>Bouteloua gracilis</i>     | 20 | 82  | 24 | Native     | N/A    |
| JJD, VM | 3 | 39 | Canadian horseweed      | <i>Conyza canadensis</i>      | 10 | 82  | 12 | Native     | N/A    |
| JJD, VM | 3 | 39 | Cheatgrass              | <i>Bromus tectorum</i>        | 30 | 82  | 37 | Noxious    | List C |
| JJD, VM | 3 | 39 | Common mullein          | <i>Verbascum thapsus</i>      | 2  | 82  | 2  | Noxious    | List C |
| JJD, VM | 3 | 39 | Plains pricklypear      | <i>Opuntia polyacantha</i>    | 5  | 82  | 6  | Native     | N/A    |
| JJD, VM | 3 | 39 | Prairie sagewort        | <i>Artemesia frigida</i>      | 5  | 82  | 6  | Native     | N/A    |
| JJD, VM | 3 | 39 | Sand dropseed           | <i>Sporobolus cryptandrus</i> | 10 | 82  | 12 | Native     | N/A    |
| JJD, VM | 3 | 40 | Blue grama              | <i>Bouteloua gracilis</i>     | 60 | 82  | 73 | Native     | N/A    |
| JJD, VM | 3 | 40 | Prairie sagewort        | <i>Artemesia frigida</i>      | 20 | 82  | 24 | Native     | N/A    |
| JJD, VM | 3 | 40 | Rubber rabbitbrush      | <i>Ericameria nauseosa</i>    | 1  | 82  | 1  | Native     | N/A    |
| JJD, VM | 3 | 40 | Scarlet globemallow     | <i>Sphaeralcea coccinea</i>   | 1  | 82  | 1  | Native     | N/A    |
| JJD, VM | 3 | 41 | Blue grama              | <i>Bouteloua gracilis</i>     | 5  | 112 | 4  | Native     | N/A    |
| JJD, VM | 3 | 41 | Cheatgrass              | <i>Bromus tectorum</i>        | 25 | 112 | 22 | Noxious    | List C |
| JJD, VM | 3 | 41 | Slender wheatgrass      | <i>Elymus trachycaulus</i>    | 80 | 112 | 71 | Native     | N/A    |
| JJD, VM | 3 | 41 | Trailing fleabane       | <i>Erigeron flagellaris</i>   | 2  | 112 | 2  | Native     | N/A    |
| JJD, VM | 3 | 42 | Broom snakeweed         | <i>Gutierrezia sarothrae</i>  | 5  | 99  | 5  | Native     | N/A    |
| JJD, VM | 3 | 42 | Cheatgrass              | <i>Bromus tectorum</i>        | 60 | 99  | 61 | Noxious    | List C |
| JJD, VM | 3 | 42 | Plains pricklypear      | <i>Opuntia polyacantha</i>    | 10 | 99  | 10 | Native     | N/A    |
| JJD, VM | 3 | 42 | Prickly Russian thistle | <i>Salsola tragus</i>         | 2  | 99  | 2  | Introduced | N/A    |
| JJD, VM | 3 | 42 | Scarlet globemallow     | <i>Sphaeralcea coccinea</i>   | 2  | 99  | 2  | Native     | N/A    |
| JJD, VM | 3 | 42 | Trailing fleabane       | <i>Erigeron flagellaris</i>   | 20 | 99  | 20 | Native     | N/A    |
| JJD, VM | 3 | 43 | Blue grama              | <i>Bouteloua gracilis</i>     | 50 | 93  | 54 | Native     | N/A    |
| JJD, VM | 3 | 43 | Common mullein          | <i>Verbascum thapsus</i>      | 2  | 93  | 2  | Noxious    | List C |
| JJD, VM | 3 | 43 | Prairie coneflower      | <i>Ratibida coumneria</i>     | 5  | 93  | 5  | Native     | N/A    |
| JJD, VM | 3 | 43 | Prairie sagewort        | <i>Artemesia frigida</i>      | 30 | 93  | 32 | Native     | N/A    |
| JJD, VM | 3 | 43 | Rubber rabbitbrush      | <i>Ericameria nauseosa</i>    | 5  | 93  | 5  | Native     | N/A    |
| JJD, VM | 3 | 43 | Spinystar               | <i>Escobaria vivipara</i>     | 1  | 93  | 1  | Native     | N/A    |
| JJD, VM | 3 | 44 | Blue grama              | <i>Bouteloua gracilis</i>     | 70 | 83  | 84 | Native     | N/A    |
| JJD, VM | 3 | 44 | Broom snakeweed         | <i>Gutierrezia sarothrae</i>  | 3  | 83  | 4  | Native     | N/A    |
| JJD, VM | 3 | 44 | Prairie sagewort        | <i>Artemesia frigida</i>      | 5  | 83  | 6  | Native     | N/A    |
| JJD, VM | 3 | 44 | Trailing fleabane       | <i>Erigeron flagellaris</i>   | 5  | 83  | 6  | Native     | N/A    |
| JJD, VM | 3 | 45 | Blue grama              | <i>Bouteloua gracilis</i>     | 40 | 85  | 47 | Native     | N/A    |
| JJD, VM | 3 | 45 | Canadian horseweed      | <i>Conyza canadensis</i>      | 5  | 85  | 6  | Native     | N/A    |
| JJD, VM | 3 | 45 | Sand dropseed           | <i>Sporobolus cryptandrus</i> | 40 | 85  | 47 | Native     | N/A    |
| JJD, VM | 3 | 46 | Alfalfa                 | <i>Medicago sativa</i>        | 20 | 95  | 21 | Introduced | N/A    |
| JJD, VM | 3 | 46 | Blue grama              | <i>Bouteloua gracilis</i>     | 40 | 95  | 42 | Native     | N/A    |
| JJD, VM | 3 | 46 | Kochia                  | <i>Bassia scoparia</i>        | 3  | 95  | 3  | Introduced | N/A    |
| JJD, VM | 3 | 46 | Plains pricklypear      | <i>Opuntia polyacantha</i>    | 15 | 95  | 16 | Native     | N/A    |
| JJD, VM | 3 | 46 | Prairie sagewort        | <i>Artemesia frigida</i>      | 15 | 95  | 16 | Native     | N/A    |
| JJD, VM | 3 | 46 | Prickly Russian thistle | <i>Salsola tragus</i>         | 2  | 92  | 2  | Introduced | N/A    |
| JJD, VM | 1 | 47 | Blue grama              | <i>Bouteloua gracilis</i>     | 40 | 92  | 43 | Native     | N/A    |
| JJD, VM | 1 | 47 | Canadian horseweed      | <i>Conyza canadensis</i>      | 20 | 92  | 22 | Native     | N/A    |
| JJD, VM | 1 | 47 | Prickly Russian thistle | <i>Salsola tragus</i>         | 10 | 92  | 11 | Introduced | N/A    |
| JJD, VM | 1 | 47 | Scarlet globemallow     | <i>Sphaeralcea coccinea</i>   | 10 | 92  | 11 | Native     | N/A    |
| JJD, VM | 1 | 47 | Trailing fleabane       | <i>Erigeron flagellaris</i>   | 2  | 92  | 2  | Native     | N/A    |
| JJD, VM | 1 | 47 | Tumbleweed              | <i>Sisymbrium irio</i>        | 10 | 92  | 11 | Introduced | N/A    |
| JJD, VM | 1 | 48 | Blue grama              | <i>Bouteloua gracilis</i>     | 40 | 50  | 80 | Native     | N/A    |
| JJD, VM | 1 | 48 | Broom snakeweed         | <i>Gutierrezia sarothrae</i>  | 1  | 50  | 2  | Native     | N/A    |
| JJD, VM | 1 | 48 | Indian ricegrass        | <i>Achnatherum hymenoides</i> | 5  | 50  | 10 | Native     | N/A    |
| JJD, VM | 1 | 48 | Scarlet globemallow     | <i>Sphaeralcea coccinea</i>   | 2  | 50  | 4  | Native     | N/A    |
| JJD, VM | 1 | 48 | Trailing fleabane       | <i>Erigeron flagellaris</i>   | 2  | 50  | 4  | Native     | N/A    |

## Analysis

| Grazing Unit #    | Survey Point # | Absolute cover (%) |            |              |         |       | Relative cover (%) |            |              |         |       |
|-------------------|----------------|--------------------|------------|--------------|---------|-------|--------------------|------------|--------------|---------|-------|
|                   |                | Native             | Introduced | Noxious Weed | Unknown | Total | Native             | Introduced | Noxious Weed | Unknown | Total |
| 2                 | 1              | 75                 | 0          | 0            | 0       | 75    | 100                | 0          | 0            | 0       | 100   |
| 2                 | 2              | 61                 | 0          | 10           | 0       | 71    | 86                 | 0          | 14           | 0       | 100   |
| 1                 | 3              | 50                 | 25         | 45           | 0       | 120   | 42                 | 21         | 38           | 0       | 100   |
| 4                 | 4              | 77                 | 10         | 0            | 0       | 87    | 89                 | 11         | 0            | 0       | 100   |
| 1                 | 5              | 70                 | 10         | 26           | 0       | 106   | 66                 | 9          | 25           | 0       | 100   |
| 2                 | 6              | 70                 | 1          | 10           | 0       | 81    | 86                 | 1          | 12           | 0       | 100   |
| 1                 | 7              | 65                 | 15         | 36           | 0       | 116   | 56                 | 13         | 31           | 0       | 100   |
| 2                 | 8              | 40                 | 25         | 10           | 0       | 75    | 53                 | 33         | 13           | 0       | 100   |
| 1                 | 9              | 92                 | 10         | 0            | 0       | 102   | 90                 | 10         | 0            | 0       | 100   |
| 3                 | 10             | 69                 | 2          | 5            | 0       | 76    | 91                 | 3          | 7            | 0       | 100   |
| 2                 | 11             | 60                 | 0          | 0            | 0       | 60    | 100                | 0          | 0            | 0       | 100   |
| 1                 | 12             | 70                 | 0          | 0            | 0       | 70    | 100                | 0          | 0            | 0       | 100   |
| 1                 | 13             | 80                 | 5          | 0            | 0       | 85    | 94                 | 6          | 0            | 0       | 100   |
| 1                 | 14             | 45                 | 20         | 45           | 0       | 110   | 41                 | 18         | 41           | 0       | 100   |
| 2                 | 15             | 45                 | 15         | 0            | 0       | 60    | 75                 | 25         | 0            | 0       | 100   |
| 1                 | 16             | 65                 | 10         | 20           | 0       | 95    | 68                 | 11         | 21           | 0       | 100   |
| 1                 | 17             | 86                 | 15         | 25           | 0       | 126   | 68                 | 12         | 20           | 0       | 100   |
| 1                 | 18             | 60                 | 0          | 45           | 0       | 105   | 57                 | 0          | 43           | 0       | 100   |
| 4                 | 19             | 85                 | 0          | 0            | 0       | 85    | 100                | 0          | 0            | 0       | 100   |
| 4                 | 20             | 65                 | 10         | 5            | 0       | 80    | 81                 | 13         | 6            | 0       | 100   |
| 4                 | 21             | 56                 | 11         | 2            | 0       | 69    | 81                 | 16         | 3            | 0       | 100   |
| 4                 | 22             | 27                 | 31         | 2            | 0       | 60    | 45                 | 52         | 3            | 0       | 100   |
| 4                 | 23             | 15                 | 25         | 35           | 0       | 75    | 20                 | 33         | 47           | 0       | 100   |
| 4                 | 24             | 30                 | 75         | 0            | 0       | 105   | 29                 | 71         | 0            | 0       | 100   |
| 4                 | 25             | 63                 | 2          | 0            | 0       | 65    | 97                 | 3          | 0            | 0       | 100   |
| 4                 | 26             | 95                 | 2          | 0            | 0       | 97    | 98                 | 2          | 0            | 0       | 100   |
| 4                 | 27             | 60                 | 0          | 5            | 0       | 65    | 92                 | 0          | 8            | 0       | 100   |
| 4                 | 28             | 35                 | 12         | 0            | 3       | 50    | 70                 | 24         | 0            | 6       | 100   |
| 4                 | 29             | 5                  | 77         | 2            | 0       | 84    | 6                  | 92         | 2            | 0       | 100   |
| 4                 | 30             | 80                 | 10         | 0            | 0       | 90    | 89                 | 11         | 0            | 0       | 100   |
| 3                 | 31             | 75                 | 5          | 20           | 0       | 100   | 75                 | 5          | 20           | 0       | 100   |
| 3                 | 32             | 90                 | 0          | 3            | 0       | 93    | 97                 | 0          | 3            | 0       | 100   |
| 4                 | 33             | 48                 | 10         | 15           | 0       | 73    | 66                 | 14         | 21           | 0       | 100   |
| 4                 | 34             | 5                  | 70         | 5            | 0       | 80    | 6                  | 88         | 6            | 0       | 100   |
| 4                 | 35             | 0                  | 77         | 0            | 0       | 77    | 0                  | 100        | 0            | 0       | 100   |
| 4                 | 36             | 5                  | 15         | 40           | 0       | 60    | 8                  | 25         | 67           | 0       | 100   |
| 4                 | 37             | 40                 | 0          | 35           | 0       | 75    | 53                 | 0          | 47           | 0       | 100   |
| 3                 | 38             | 20                 | 0          | 70           | 0       | 90    | 22                 | 0          | 78           | 0       | 100   |
| 3                 | 39             | 50                 | 0          | 32           | 0       | 82    | 61                 | 0          | 39           | 0       | 100   |
| 3                 | 40             | 82                 | 0          | 0            | 0       | 82    | 100                | 0          | 0            | 0       | 100   |
| 3                 | 41             | 87                 | 0          | 25           | 0       | 112   | 78                 | 0          | 22           | 0       | 100   |
| 3                 | 42             | 37                 | 2          | 60           | 0       | 99    | 37                 | 2          | 61           | 0       | 100   |
| 3                 | 43             | 91                 | 0          | 2            | 0       | 93    | 98                 | 0          | 2            | 0       | 100   |
| 3                 | 44             | 83                 | 0          | 0            | 0       | 83    | 100                | 0          | 0            | 0       | 100   |
| 3                 | 45             | 85                 | 0          | 0            | 0       | 85    | 100                | 0          | 0            | 0       | 100   |
| 3                 | 46             | 70                 | 25         | 0            | 0       | 95    | 74                 | 26         | 0            | 0       | 100   |
| 1                 | 47             | 72                 | 20         | 0            | 0       | 92    | 78                 | 22         | 0            | 0       | 100   |
| 1                 | 48             | 50                 |            | 0            | 0       | 50    | 100                | 0          | 0            | 0       | 100   |
| Average Cover (%) |                | 58                 | 14         | 13           | 0       | 85    | 69                 | 16         | 15           | 0       | 100   |

### Riparian Quality

#### General Riparian Description

The riparian quality along Bijou Creek varies throughout the corridor but is generally in fair to good condition. Wetland reestablishment and riparian tree and shrub recruitment were observed in areas close to the creek channel; however, further from the channel, a higher amount of senescence (degradation) and tree die-off was observed, likely due to a combination of aggradation and degradation of the stream system from high flow events that has resulted in erosion and disconnection from the floodplain. General observations from the riparian assessment are described below, and details from the Technical Riparian Assessment are discussed in the following section.

- More canopy senescence further from the channel, with up to 70-90 percent where flooding and incision has disconnected floodplain from the main channel. This is present particularly in the downstream (northern) half of the project area.
- The downstream portion of creek corridor has more sediment in the riparian terraces with less herbaceous cover, dominated by sweetclover (*Melilotus officinalis*), smooth brome, and western wheatgrass, with intermittent areas where showy milkweed (*Asclepias speciosa*) is establishing.
- The channel in the downstream portion of the creek corridor is narrower and shows signs of intermittent wetland establishment (about 30 percent cover in pockets and fringes) (shown on Figure 8). This area is dominated by a mixture of native and invasive species, including barnyard grass (*Echinochloa crus-galli*), annual rabbitsfoot grass (*Polypogon monspeliensis*), common threesquare, and some plains cottonwood seedlings.
- Generally, the channel is wider and drier in the central portion of the project area. Signs of riparian recruitment is minimal but there is more diverse and native vegetative cover. There is generally less senescence in the tree canopy.
- Channels with flows were observed in the upstream (southern) portion of the creek corridor in the Property. Wetlands are reestablishing in this area with higher cover of native species, including cottonwood and some sandbar willow seedlings and saplings. Overall, there is more riparian shrub and tree recruitment and less senescence in the tree canopy.

#### Technical Riparian Assessment Findings

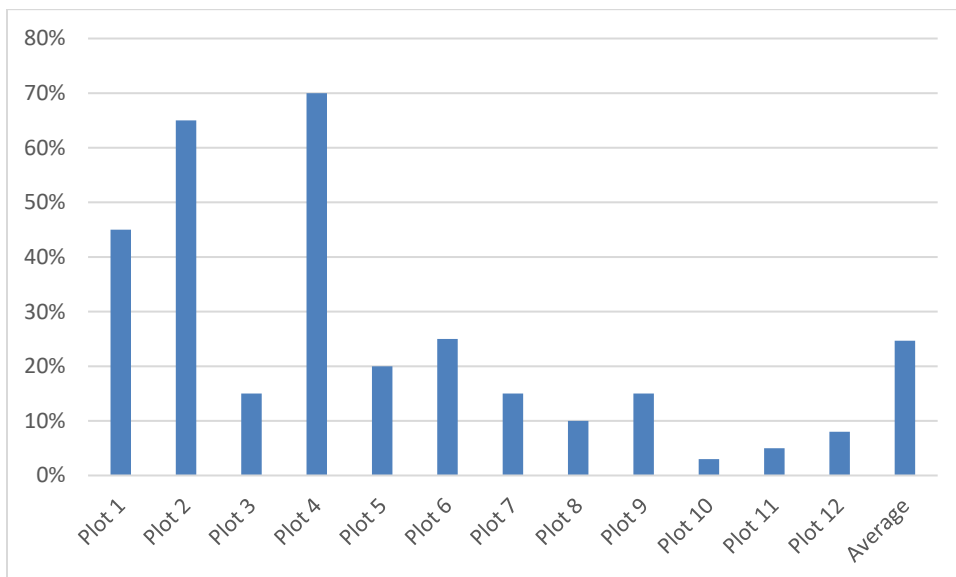
ERO randomly assigned 12 plots in Unit 4 in the Western Great Plains Riparian/Floodplain community (shown on Figure 8) along the creek corridor to assess the riparian quality. Within each plot, ERO evaluated the general conditions of the tree and shrub strata, and to evaluate the riparian quality, ERO scored habitat attributes or function metrics for Preble's meadow jumping mouse (*Zapus hudsonius preblei*; Preble's) because this species is an indicator species of healthy riparian ecosystems. The results are summarized below and the data from the Technical Riparian Assessment are in Appendix D.

Additionally, the riparian quality was assessed in grazing Unit 2. Channel incision within this unit was between 4- to 8-feet high, with sparse herbaceous cover on the riparian terraces dominated by sweet clover, western wheatgrass, smooth brome, and showy milkweed. The overstory is dominated by plains cottonwood and Russian olive with about 80-90 percent live canopy. There was no flowing water in the

channel though about 30 percent cover of wetlands reestablishing in this area were dominated by a mixture of native and introduced herbaceous species and cottonwood seedlings.

#### *Tree Canopy*

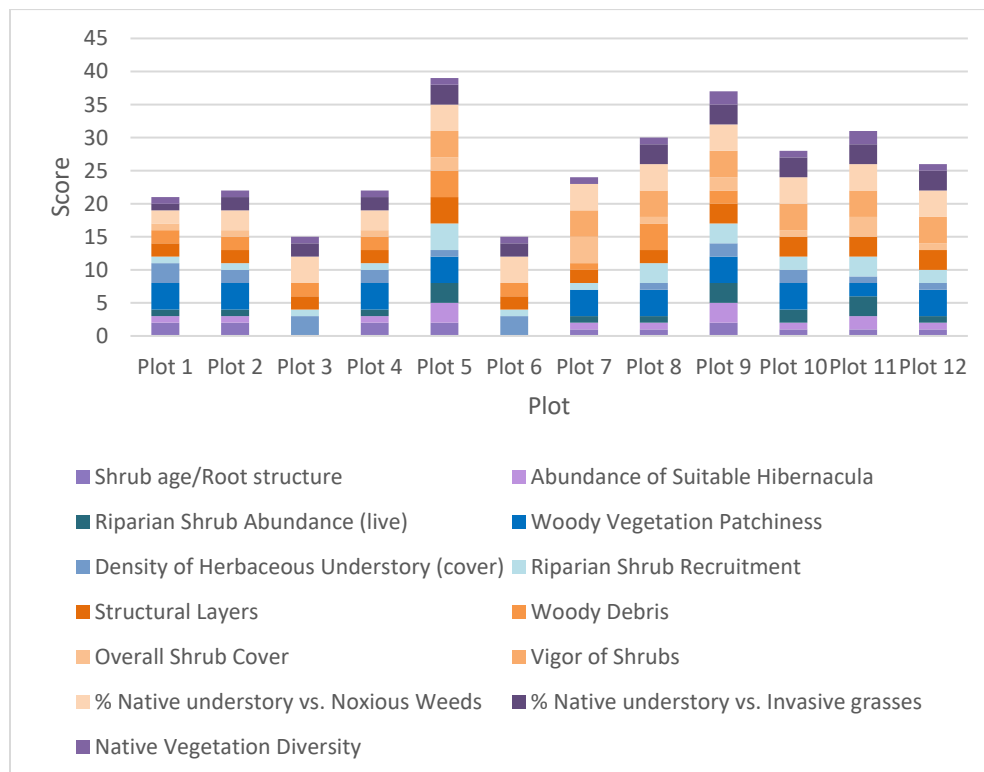
- Nine of the 12 plots had a multi-age, open canopy. The three remaining plots (Plot 3, Plot 6, and Plot 12) had a single-age open canopy. The plots with single-age open canopies consisted primarily of young trees and saplings.
- Plots with the most deterioration evaluated by percent senescence (**Graph 4**) were observed at the downstream end of the Property.
- There were few areas adjacent to the Bijou Creek channel that provided cavities as potential nesting opportunities for birds due to their size. Typically, larger diameter trees provide nesting places and cover for various birds.
- Tree regeneration was observed at Plot 4 and Plot 5, and Plot 7 through Plot 12.



**Graph 1. Senescence in Tree Canopy (percent die-off)**

#### *Shrub Layer*

- Two of the 12 plots had a multi-age, open shrub canopy (Plot 5 and Plot 9), another two plots had a single age, open shrub canopy (Plot 5 and Plot 9), and the eight remaining plots did not have a shrub layer present (Plot 1 through Plot 4, Plot 6 through Plot 8, and Plot 10).
- Plots with the most deterioration evaluated by percent senescence (**Graph 4**) were observed at the downstream end of the Property.
- There was little senescence (less than 12 percent) observed in the shrub layer across the evaluated plots. Most of the shrub layer that was observed along the channel was new growth, rather than established, mature shrubs.



## **Grazing Effects on Riparian Quality**

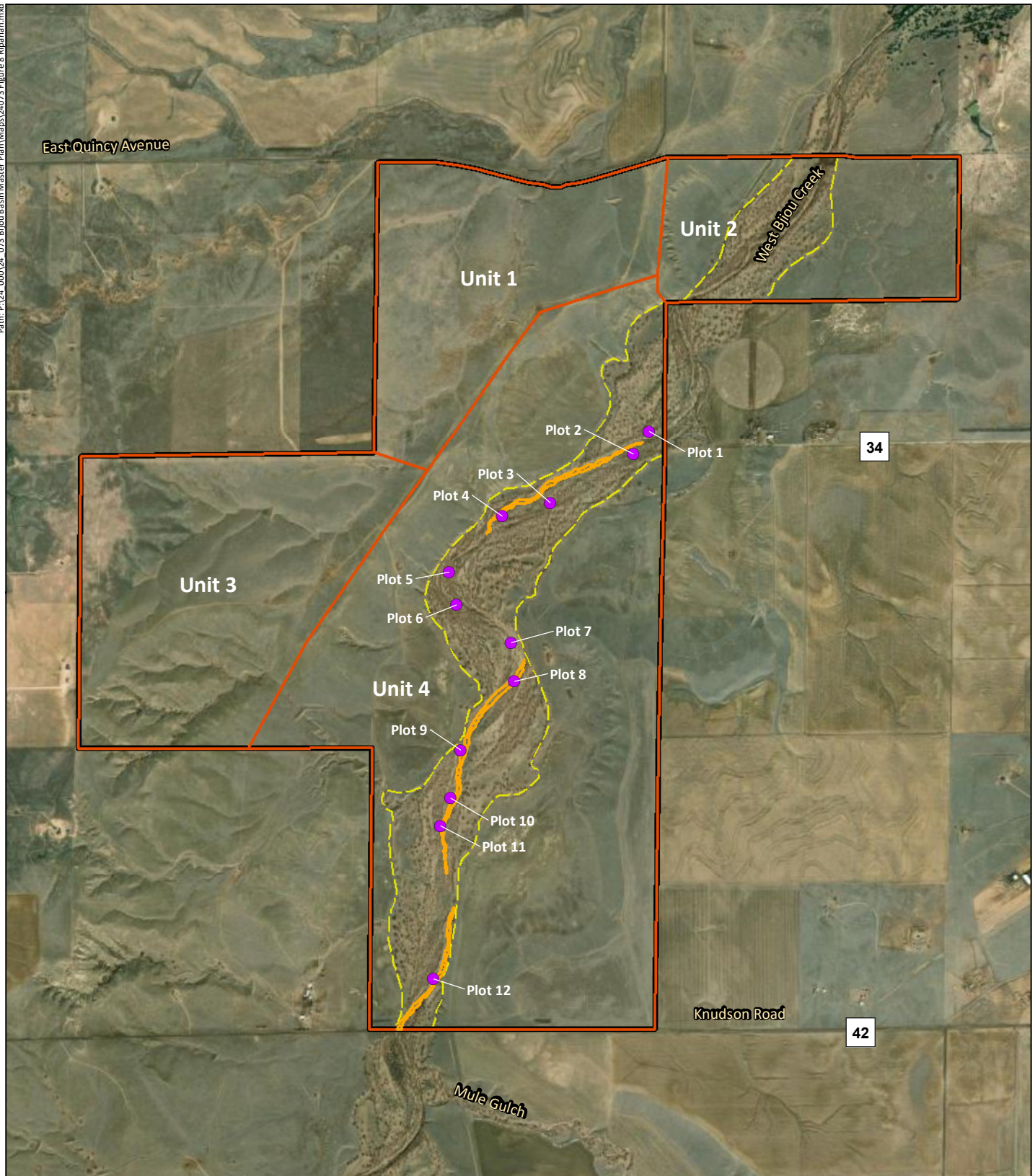
Cattle are currently allowed to graze in the riparian areas of grazing Unit 2 and calving operations have occurred in this area in the past. During the summer 2024 site visit, evidence of grazing was more evident in the higher terraces whereas closer to the creek channel it was less obvious and was limited to light herbivory observed to willows on herbaceous vegetation. Adverse effects of grazing in the riparian areas can be contributed to the time of year and length of time cattle are present in these areas. Unmanaged grazing in riparian and wetland areas could lead to detrimental impacts from the alteration of geomorphology, soil/water chemistry, and vegetation. Though fencing could help keep cattle away from sensitive riparian areas, it may ultimately lead to more degradation in the fenced areas.

## **Riparian Recommendations**

The riparian floodplain is a high-value biological resource, though it may be in a state of transition due to recent flooding and grazing impacts. Erosion and incision are the main concerns along the creek corridor with high cottonwood die off and low recruitment in some areas. Future riparian considerations should focus on increasing cottonwood recruitment and maintaining the existing cottonwood population.

Recommendations for hydrologic resources and the riparian area include:

- Site planning should minimize riparian impacts as much as possible.
- Explore potential riparian improvement options (such as cottonwood sapling plantings) to enhance the creek corridor.
- Monitor creek channel and riparian habitat condition along Bijou Creek to ensure ample foraging opportunities are available.
- Consider standing dead tree removal if development occurs in the creek corridor for visitor safety.
- Monitor wetland reestablishment closer to the creek channel to ensure habitat quality is maintained.
- Consider incorporating a grazing management plan to better understand when cattle should or should not be allowed in the riparian areas.



### Bijou Basin Open Space

-  Property Boundary
-  Riparian Vegetation Plot
-  Intermittent Wetlands (11.32 ac)
-  Grazing Unit
-  Riparian Boundary



**Figure 8**  
**Riparian Assessment**

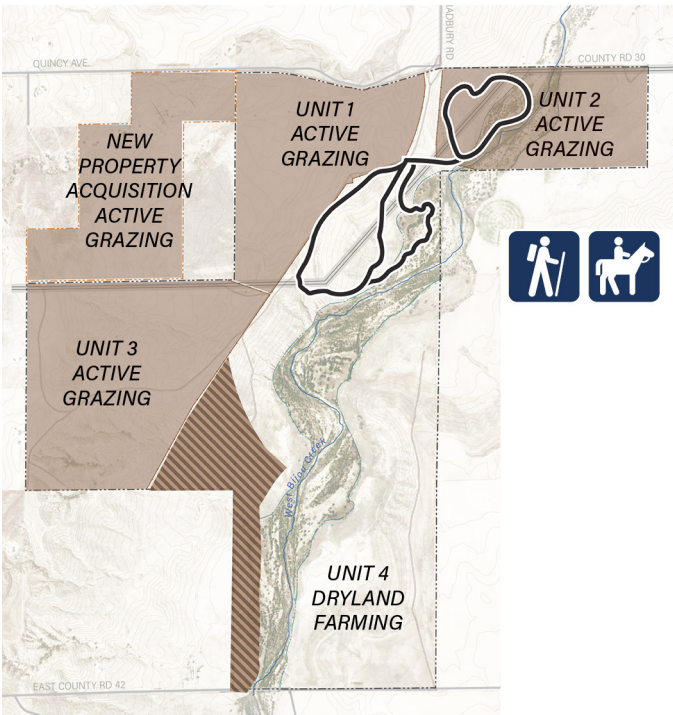
Prepared for: Arapahoe County  
File: 24073 Figure 8 Riparian.mxd [dlH]  
September 12, 2024

**ERO**  
ERO Resources Corp.

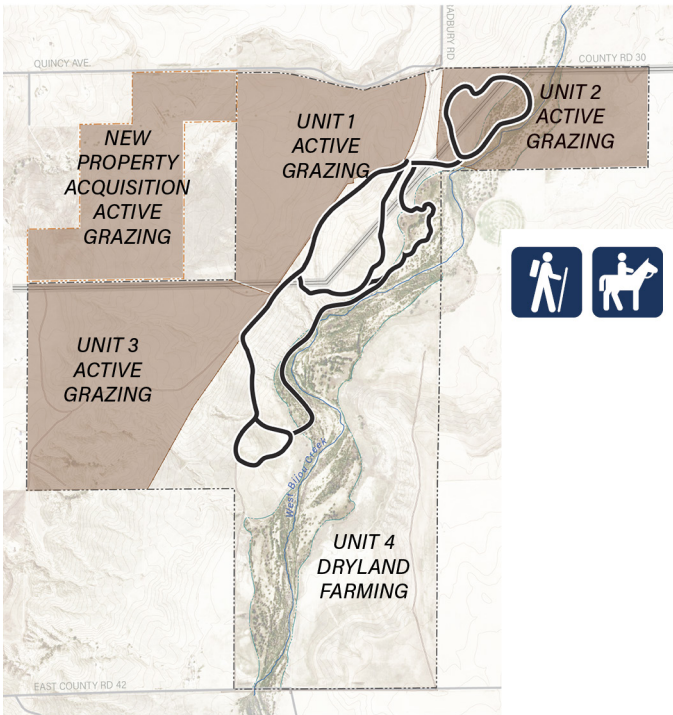
# TRAIL CONCEPT ALTERNATIVES

## Trail Concepts Overview

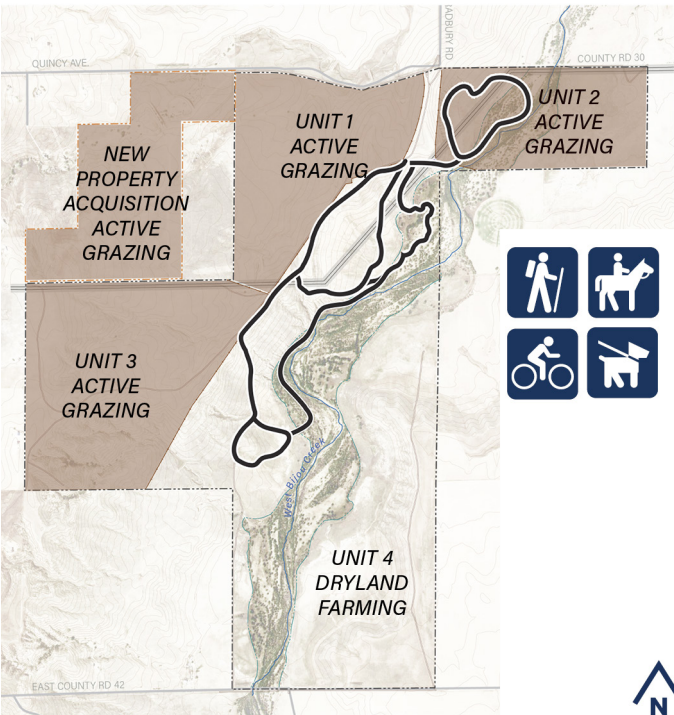
**LOW RECREATION**  
NORTHERN TRAILS  
~ 4.2 MILES  
1,851 ACRES OF GRAZING



**MEDIUM RECREATION**  
EXPANDED TRAILS  
~ 7 MILES  
1,614 ACRES OF GRAZING



**HIGH RECREATION**  
EXPANDED MULTI-USE TRAILS  
~ 7 MILES  
MORE TRAIL AMENITIES  
1,614 ACRES OF GRAZING



### LEGEND

- RECREATIONAL TRAIL
- ACTIVE GRAZING
- ADDITIONAL GRAZING
- RIPARIAN ZONE
- CREEK

### CONCEPT HIGHLIGHTS

- Trails are accessible to hikers and equestrians only to reduce potential visitor conflicts and impacts to grazing operations, and to protect natural resources.
- Consolidates trails to the northern portion of the site, which minimizes maintenance for operations staff.
- Preserves existing grazing and farming operations and potentially increases total grazing acreage by 217 AC.
- Provides highest level of natural resource protection.

### CONCEPT HIGHLIGHTS

- Trails are accessible to hikers and equestrians only to reduce potential visitor conflicts and impacts to grazing operations, and to protect natural resources.
- Expands trails to the south to increase total trail mileage.
- Preserves existing grazing and farming acreage and operations.
- Provides a medium level of natural resource protection.

### CONCEPT HIGHLIGHTS

- Trails are accessible to hikers, equestrians, bikers, and dogs on-leash.
- Expands trails to the south and broadens user types to increase total trail mileage and to create the most recreational opportunities.
- Preserves existing acreage for grazing and farming but potentially has the highest impact on grazing and farming operations.
- Potential highest impact on natural resources due to expanded users.
- Increases potential programming.

# LOW RECREATION Northern Trails

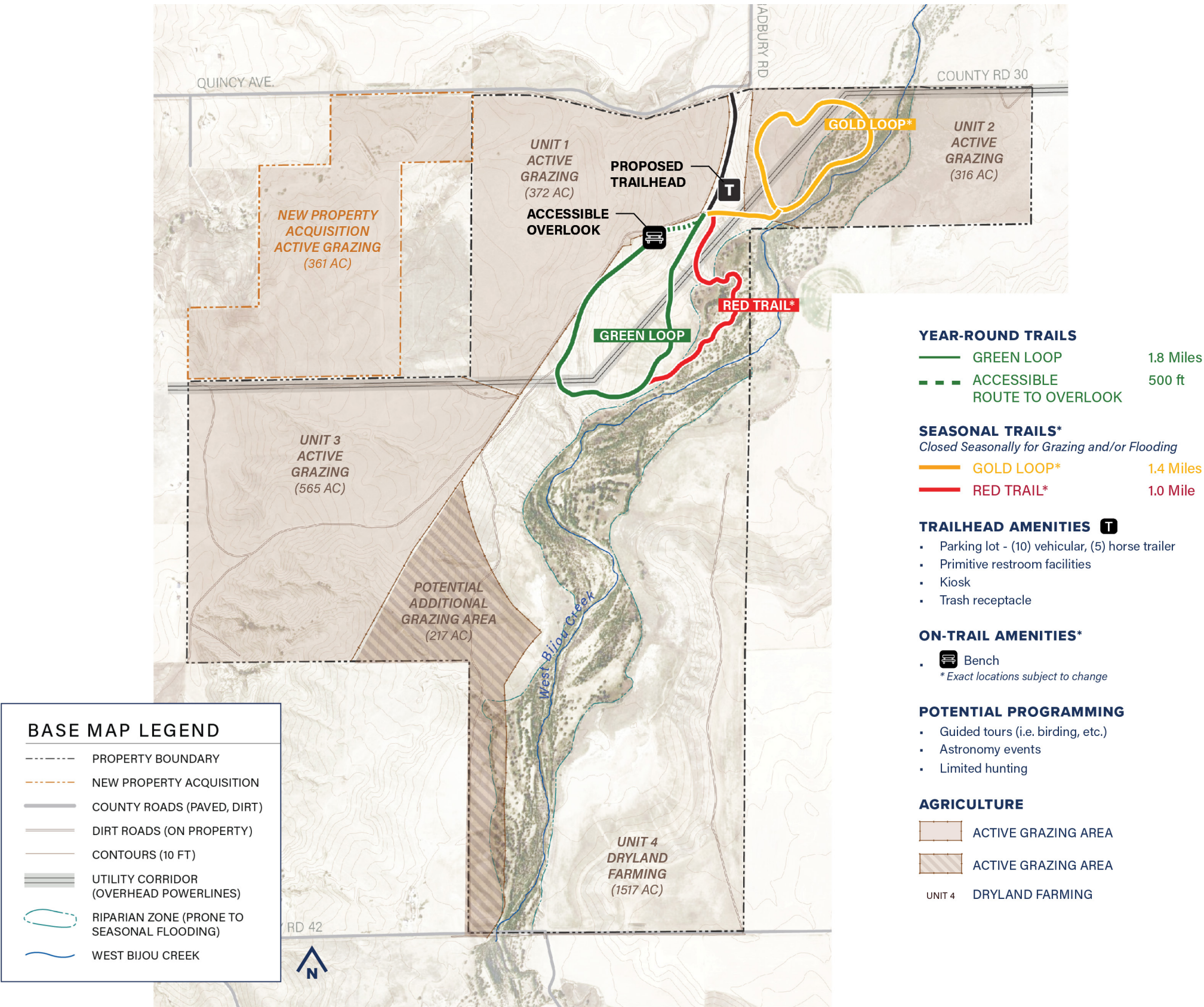
~ 4.2 MILES

1,851 ACRES OF GRAZING



## CONCEPT HIGHLIGHTS

- Trails are accessible to hikers and equestrians only to reduce potential visitor conflicts and impacts to grazing operations, and to protect natural resources.
- Consolidates trails to the northern portion of the site, which minimizes maintenance for operations staff.
- Preserves existing grazing and farming operations and potentially increases total grazing acreage by 217 AC.
- Provides highest level of natural resource protection.



# MEDIUM RECREATION

## Expanded Trails

~ 7 MILES

1,614 ACRES OF GRAZING



### CONCEPT HIGHLIGHTS

- Trails are accessible to hikers and equestrians only to reduce potential visitor conflicts and impacts to grazing operations, and to protect natural resources.
- Expands trails to the south to increase total trail mileage.
- Preserves existing grazing and farming acreage and operations.
- Provides a medium level of natural resource protection.

BASE MAP LEGEND

PROPERTY BOUNDARY

NEW PROPERTY ACQUISITION

COUNTY ROADS (PAVED, DIRT)

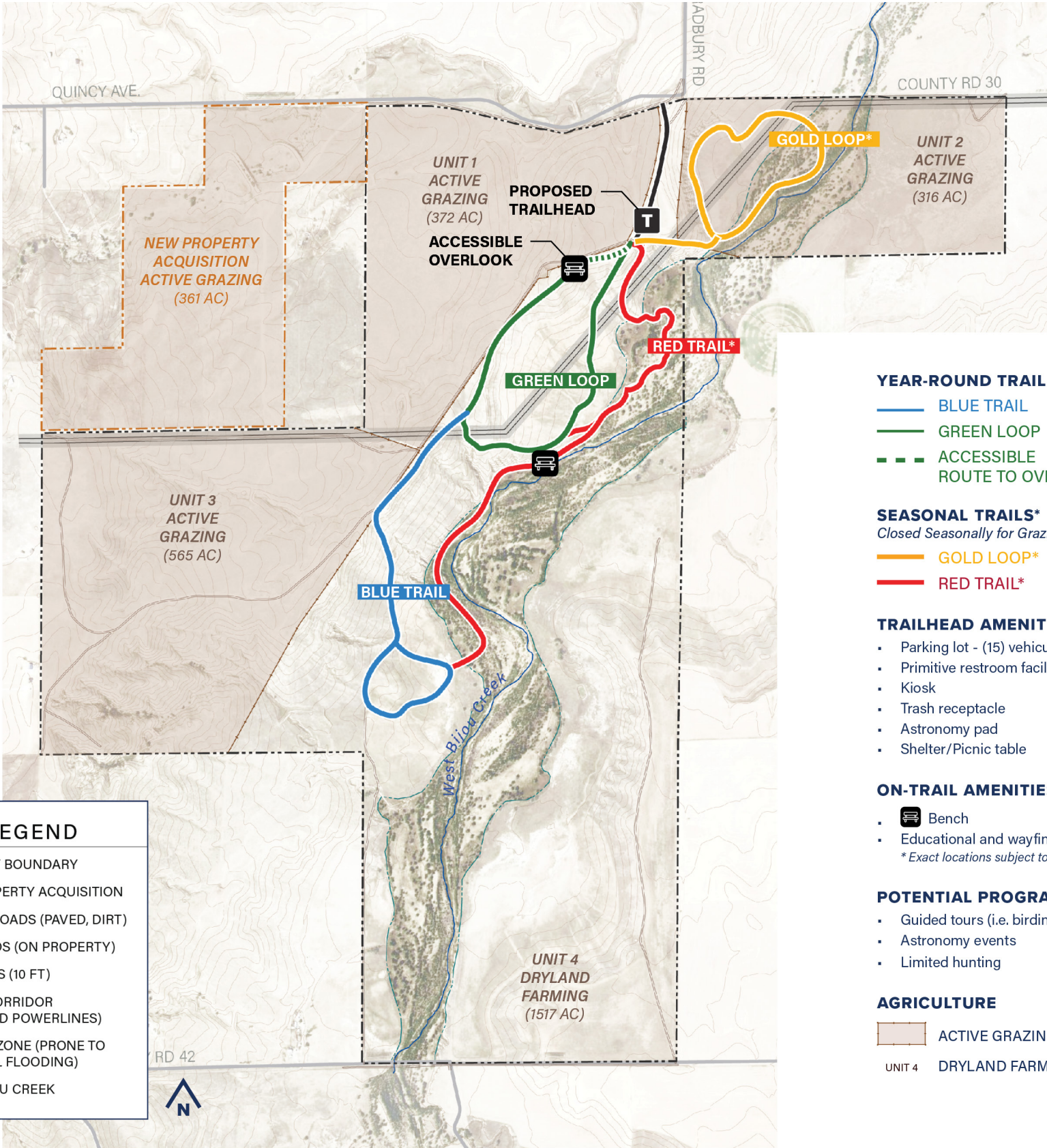
DIRT ROADS (ON PROPERTY)

CONTOURS (10 FT)

UTILITY CORRIDOR (OVERHEAD POWERLINES)

RIPARIAN ZONE (PRONE TO SEASONAL FLOODING)

WEST BIJOU CREEK



#### YEAR-ROUND TRAILS

|                              |           |
|------------------------------|-----------|
| BLUE TRAIL                   | 1.7 Miles |
| GREEN LOOP                   | 1.8 Miles |
| ACCESSIBLE ROUTE TO OVERLOOK | 500 ft    |

#### SEASONAL TRAILS\*

Closed Seasonally for Grazing and/or Flooding

|            |           |
|------------|-----------|
| GOLD LOOP* | 1.4 Miles |
| RED TRAIL* | 2.1 Mile  |

#### TRAILHEAD AMENITIES **T**

- Parking lot - (15) vehicular, (6) horse trailer
- Primitive restroom facilities
- Kiosk
- Trash receptacle
- Astronomy pad
- Shelter/Picnic table

#### ON-TRAIL AMENITIES\*

- Bench
  - Educational and wayfinding signage
- \*Exact locations subject to change*

#### POTENTIAL PROGRAMMING

- Guided tours (i.e. birding, etc.)
- Astronomy events
- Limited hunting

#### AGRICULTURE

|             |                     |
|-------------|---------------------|
| <div></div> | ACTIVE GRAZING AREA |
| UNIT 4      | DRYLAND FARMING     |

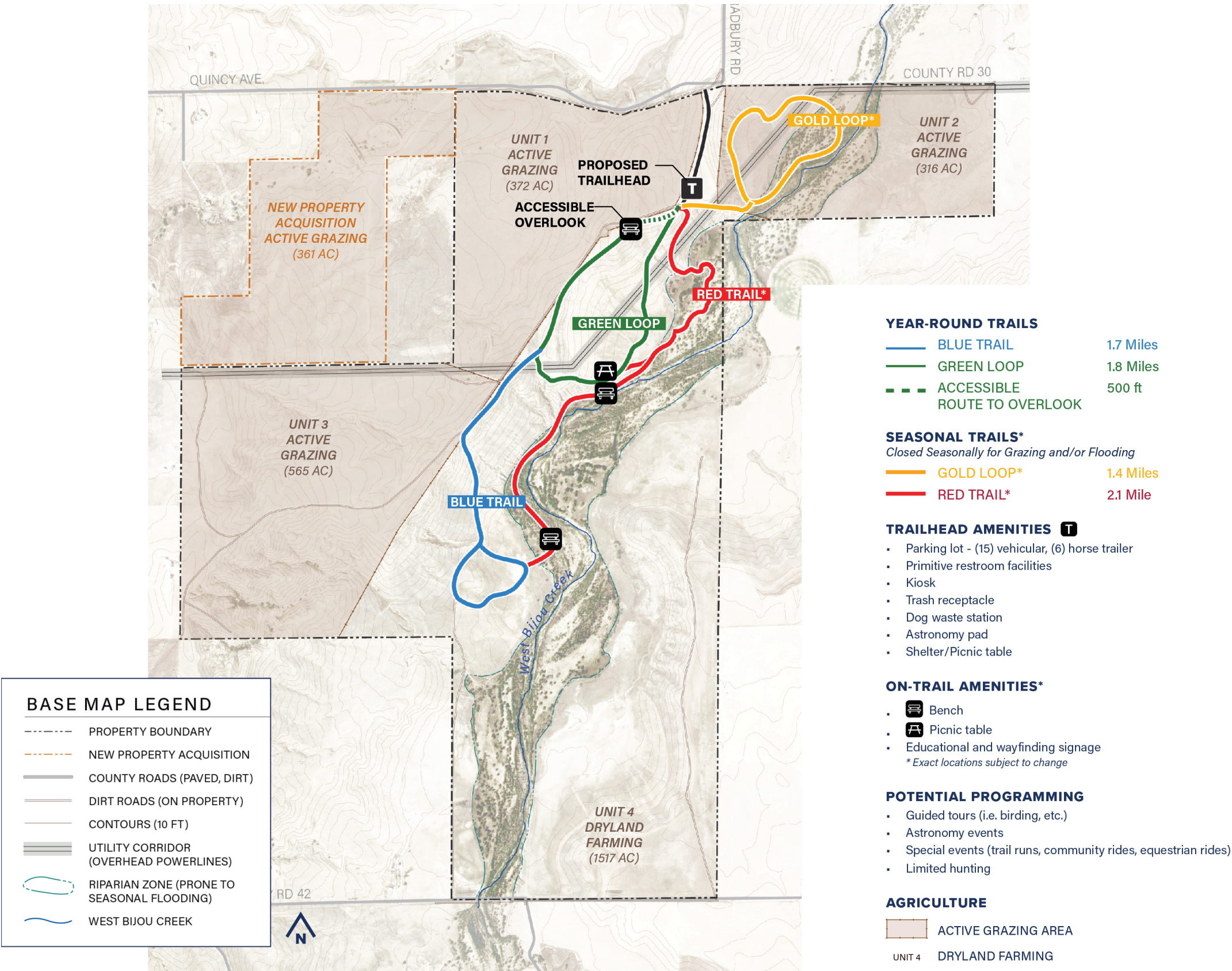
# HIGH RECREATION Expanded Multi-Use Trails

~ 7 MILES  
WITH MORE TRAIL AMENITIES  
1,614 ACRES OF GRAZING



## CONCEPT HIGHLIGHTS

- Trails are accessible to hikers, equestrians, bikers, and dogs on-leash.
- Expands trails to the south and broadens user types to increase total trail mileage and to create the most recreational opportunities.
- Preserves existing acreage for grazing and farming but potentially has the highest impact on grazing and farming operations.
- Potential highest impact on natural resources due to expanded users.
- Increases potential programming.





Bijou Basin Open Space  
Opinion of Probable Costs - Master Plan

19-Sep-25

|    | Item                                                     | Qty.    | Unit | Unit Cost                              | Total Cost   |
|----|----------------------------------------------------------|---------|------|----------------------------------------|--------------|
|    | Trails                                                   |         |      |                                        |              |
| 1  | 12-foot 6" road base trail (to turnaround)               | 2,222   | SF   | \$ 105.00                              | \$ 233,310   |
| 2  | Extend access to south entrance (Class 6 Road Base)      | 1,297   | CY   | \$ 105.00                              | \$ 136,185   |
| 3  | Stabilized crusher fines ADA rest area                   | 2,000   | SF   | \$ 4.50                                | \$ 9,000     |
| 4  | 6-foot wide soft surface trails                          | 166,320 | SF   | \$ 2.40                                | \$ 399,168   |
| 5  | New gates for unit 1                                     | 1       | EA   | \$ 2,000.00                            | \$ 2,000     |
|    |                                                          |         |      | Subtotal - Hard Costs                  | \$ 779,663   |
|    | Amenities - Trailhead                                    |         |      |                                        |              |
| 1  | Demolition                                               | 20,000  | SF   | \$ 3.00                                | \$ 60,000    |
| 2  | Earthwork                                                | 370     | CY   | \$ 30.00                               | \$ 11,100    |
| 3  | Picnic Tables                                            | 4       | EA   | \$ 5,500.00                            | \$ 22,000    |
| 4  | Benches                                                  | 2       | EA   | \$ 4,000.00                            | \$ 8,000     |
| 5  | Trash/Recycling Receptacles                              | 4       | EA   | \$ 2,000.00                            | \$ 8,000     |
| 6  | Shelters                                                 | 2       | EA   | \$ 80,000.00                           | \$ 160,000   |
| 7  | Concrete pad for shelters                                | 1,840   | SF   | \$ 12.00                               | \$ 22,080    |
| 8  | Horse hitching post                                      | 4       | EA   | \$ 2,000.00                            | \$ 8,000     |
| 9  | Kiosk sign at trailhead                                  | 1       | EA   | \$ 30,000.00                           | \$ 30,000    |
| 10 | Single Vault Toilet                                      | 1       | AL   | \$ 150,000.00                          | \$ 150,000   |
| 11 | Site Entry Features (walls, boulders)                    | 1       | AL   | \$ 25,000.00                           | \$ 25,000    |
|    |                                                          |         |      | Subtotal - Hard Costs                  | \$ 504,180   |
|    | Amenities - On-Trail                                     |         |      |                                        |              |
| 1  | Benches                                                  | 3       | EA   | \$ 2,500.00                            | \$ 7,500     |
| 2  | Signage - Wayfinding, Trail Rules, Educational           | 1       | AL   | \$ 75,000.00                           | \$ 75,000    |
| 3  | Accessible overlook                                      | 1       | AL   | \$ 150,000.00                          | \$ 150,000   |
|    |                                                          |         |      | Subtotal - Hard Costs                  | \$ 232,500   |
|    | Planting                                                 |         |      |                                        |              |
| 1  | Native reseeding (disturbed areas)                       | 1       | AL   | \$ 50,000.00                           | \$ 50,000    |
|    |                                                          |         |      | Subtotal - Hard Costs                  | \$ 50,000    |
|    | Road and Parking Area                                    |         |      |                                        |              |
| 1  | Survey                                                   | 1       | EA   | \$ 30,000.00                           | \$ 30,000    |
| 2  | Demolition - existing entrance road                      | 24,900  | SF   | \$ 6.00                                | \$ 149,400   |
| 3  | Earthwork                                                | 461     | CY   | \$ 30.00                               | \$ 13,820    |
| 4  | Gravel - Wider entrance road                             | 53,950  | SF   | \$ 4.00                                | \$ 215,800   |
| 5  | Aggregate basecourse for entrance road (Class 6, 4 inch) | 2,303   | CY   | \$ 90.00                               | \$ 207,293   |
| 6  | Monument sign, entrance                                  | 1       | EA   | \$ 30,000.00                           | \$ 30,000    |
| 7  | Gravel parking areas                                     | 44,005  | SF   | \$ 4.00                                | \$ 176,020   |
| 8  | Aggregate basecourse for parking areas (Class 6, 6 inch) | 2,442   | CY   | \$ 105.00                              | \$ 256,439   |
| 9  | Concrete curb stops                                      | 20      | EA   | \$ 150.00                              | \$ 3,000     |
| 10 | Landscape boulders                                       | 20      | EA   | \$ 950.00                              | \$ 19,000    |
| 11 | Removal of existing fencing                              | 4,360   | LF   | \$ 15.00                               | \$ 65,400    |
| 12 | Shifted grazing unit fencing                             | 4,360   | LF   | \$ 20.00                               | \$ 87,200    |
| 13 | Wood fencing around parking areas                        | 870     | LF   | \$ 42.00                               | \$ 36,540    |
| 14 | Solar Lighting for security                              | 1       | AL   | \$ 40,000.00                           | \$ 40,000    |
|    |                                                          |         |      | Subtotal - Hard Costs                  | \$ 1,329,911 |
|    |                                                          |         |      | Sum Total                              | \$ 2,896,254 |
|    |                                                          |         |      | Contingency (30%)                      | \$ 868,876   |
|    |                                                          |         |      | Mobilizaition/General Conditions (20%) | \$ 579,251   |
|    |                                                          |         |      | Final Total                            | \$ 4,344,381 |

Notes/Assumptions:

- 1. Does not include inflation.
- 2. Costs were developed using cost database from February 2025